



Subject: Applied Chemistry – BSCCM12303

Type of course: Major

Prerequisite: Students should have knowledge of general chemistry.

Rationale: Applied chemistry is the branch of chemistry that focuses on the application of chemical knowledge to solve real-world problems. The goal of applied chemistry is to use knowledge about elements and chemical interactions to advance other scientific fields such as medicine, pharmacology.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks					Total Marks
CI	T	P		C	SEE		CCE		
			Theory		Practical	MSE	LWA/V	ALA	
3	0	2	4	75	25	30	20	50	200

Legends: CI-Class Room Instructions; T- Tutorial; P - Practical; C – Credit; SEE - Semester End Evaluation; MSE- Mid Semester Examination; LWA - Lab Work Assessment; V – Viva voce; CCE-Continuous and Comprehensive Evaluation; ALA- Active Learning Activities.

3 Credits * 25 Marks = 75 Marks (each credit carries 25 Marks) Theory
 1 Credits * 25 Marks = 25 Marks (each credit carries 25 Marks) Practical
 SEE 100 Marks will be converted in to 50 Marks
 CCE 100 Marks will be converted in to 50 Marks
 It is compulsory to pass in each individual component.



Course Content:

Unit No	Course content	Hrs	% Weightage
1	<p>Chapter-1: Polymer chemistry</p> <ul style="list-style-type: none"> • Introduction, Classification of Polymers by various ways • Synthesis and uses of following polymers: Polyethylene. • Synthesis and uses of following polymers: Polyvinyl chloride. • Synthesis and uses of the following fibers: Nylone-6. • Synthesis and uses of the following fibers: Nylone-6,6. • Synthesis and uses of the following rubbers: Polybutadiene. • Synthesis and uses of the following rubbers Polyisoprene. • Synthesis and uses of the following resins: Phenol formaldehyde. • Synthesis and uses of the following resins: Melamine and Bakelite. • Synthesis and uses of biodegradable polymers: PHBV • Synthesis and uses of biodegradable polymers: Nylon-2-nylon-6 <p>Chapter-2 : Cement and Refractors</p> <ul style="list-style-type: none"> • Cement, constituting compounds in cement. • Compositions and manufacturing of Portland cement. • Setting and hardening of cement. • Glass and its general properties. • Manufacture of glass, variety of glasses and their application. • Definition of refractories. Characteristics and Application of refractories. • Classification of refractories: Acid. Basic and neutral refractories. 	15	25



<p>2</p>	<p>Chapter-3 Chemistry of Water</p> <ul style="list-style-type: none"> • Introduction, Source of water, Hard water and soft water. • Salts cause water hardness, Unit of hardness, and simple numerical on water hardness. • Problems caused by the use of hard water in boilers and its prevention. • Scale and sludge, Foaming and Priming, Caustic embrittlement, Corrosion. • Water softening techniques: Soda-lime process, Zeolite process, Ion exchange process, Reverse Osmosis process. • Treatment of Municipal drinking water • Screening, Sedimentation, Coagulation, Filtration, Sterilization of water by chlorination, Break-point of Chlorination. • Enlist Indian standard specifications of drinking water. 	<p>10</p>	<p>25</p>
<p>3</p>	<p>Chapter-4 Corrosion of metals & its prevention</p> <ul style="list-style-type: none"> • Corrosion: Dry or Chemical corrosion. • Oxidation corrosion- mechanism, Corrosion by other gases. • Wet or Electrochemical corrosion- H₂ liberation and O₂ absorption mechanism of electrochemical corrosion • Galvanic corrosion mechanism. • Concentration cell corrosion. • Pitting corrosion, Waterline, and Crevice Corrosion • Factors affecting the rate of corrosion: • Nature of the metal, Nature of surface film, Relative areas of the anodic and cathodic parts, Purity of metal, Temperature, Humidity of air, Influence of pH. • Internal and external corrosion preventive measures: • Modification of Environment, Modification of properties of metal. • Uses of protective coatings, Anodic and cathodic protection. • Modification in design and choice of material. 	<p>10</p>	<p>25</p>



4	<p>Chapter-5 Fuels & Combustion</p> <ul style="list-style-type: none"> • Definition and classification of fuels, calorific values and their units. • Determine of calorific value using a bomb calorimeter. • Characteristics of good fuel. • Comparison between solid, liquid and gaseous fuels. • Theoretical calculation of HCV & LCV of fuel using Dulong's formula. • Solid fuel: Coal, Classification of coal, Proximate and Ultimate analysis of coal. • Liquid Fuel, petroleum , origin of petroleum and classification of petroleum ,Refining of petroleum. • Petrol and diesel fuel rating (Octane and Cetane numbers), power alcohol and bio diesel. • Chemical composition calorific value and application of LPG, CNG, Water gas, Coal Gas, Producer gas and bio gas. 	10	25
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Continuous Assessment:

Sr. No	Active Learning Activities	Marks
1	<p>Magazine Reading Faculty will give name of chemistry related magazine and students will prepare a mini review and upload it to GMIU web Portal.</p>	10
2	<p>Guided Tour Worksheets Provide students with worksheets or questionnaires to complete during the industrial visit. These can include questions about what they observe, how the processes work, and any unexpected findings and upload it on GMIU web Portal.</p>	10
3	<p>Video Analysis Faculty will assign the video and group of students will prepare a Report in 250 words And upload it to GMIU web Portal.</p>	10



4	Lab experiment (Minor Project) Faculty will give experiment name (Ex. Fire snake, Lemon Volcano, Cabbage Chemistry) and students will perform it and make a video and upload in to GMIU web Portal.	10
5	Attendance	10
Total		50

Suggested Specification table with Marks (Theory):75

Distribution of Theory Marks (Revised Bloom's Taxonomy)						
Level	Remembrance (R)	Understanding (U)	Application (A)	Analyze (N)	Evaluate (E)	Create (C)
Weightage	30%	40%	30%	-	-	-

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Course Outcome:

After learning the course the students should be able to:

CO1	Explain the properties and application of synthetic rubbers and polymers.
CO2	Assess the efficiency of various fuels.
CO3	Apply the different treatment methods for purification of water.
CO4	Identify the different factors affecting the rate of corrosion.

List of Practical:

Sr. No	Descriptions	Unit No	Hrs
1	Prepare polystyrene, Urea formaldehyde, Phenol formaldehyde & its characterization.	1	6
2	Prepare Polystyrene and Bakelite.	1	4



3	Estimate total hardness of given water sample using standard EDTA solution.	3	2
4	Estimate alkalinity of given water sample using 0.01M sulphuric acid solution.	3	2
5	Determine Total Dissolved Solid (TDS) and Total Suspended Solid (TSS) in a given sample of water.	3	2
6	Determine the Iron content in a given cement sample using a colorimeter.	2	2
7	Determine pH-Values of given samples of Solution by using Universal Indicator and pH-meter.	3	2
8	Study of Corrosion of Metals in the different Mediums.	4	2
9	Study of corrosion of metals in medium of different pH.	4	2
10	Determine the Ash content of given sample of coal.	5	4
11	Determine the moisture content of coal.	5	2
Total			30

Instructional Method:

The course delivery method will depend upon the requirement of content and need of students. The teacher in addition to conventional teaching method by black board, may also use any of tools such as demonstration, role play, Quiz, brainstorming, MOOCs etc.

From the content 10% topics are suggested for flipped mode instruction.

Students will use supplementary resources such as online videos, NPTEL/SWAYAM videos, e-courses, Virtual Laboratory .

The internal evaluation will be done on the basis of Active Learning Assignment.

Practical/Viva examination will be conducted at the end of semester for evaluation of performance of students in laboratory.

Reference Books:

- [1] Engineering Chemistry JAIN & JAIN Dhanpat Rai and Sons
- [2] A Textbook of Engineering Chemistry Dr S. S. Dara & Dr S. S. Umare S. Chand & Co.(P) Ltd., New Delhi,
- [3] Textbook of Chemistry for Class XI & XII (Part-I & II) NCERT NCERT, New Delhi
- [4] Engineering Chemistry Shikha Agarwal Cambridge Uni. Press, New Delhi
- [5] Understanding Chemistry C.N.R. Rao C.N.R. Rao World scientific publishing Co.

