FS BE-I (Chemical Engineering)

	The Maharaja Sayajirao University of Baroda **Faculty Technology and Engineering** **Department of Applied Chemistry**	**Academic Year**	**2020-21**

BE-I (Chemical Engineering): Regular Programme

Year	**I**	**Core / ~~Elective / Foundation~~** **ACH 1201: Applied Chemistry**	**Credits / Hours per week**	**04**
Semester	**I**	Year of Syllabus Revision: 2009	**Maximum Marks / Grade**	**100**
Mode of Transaction		Lectures and Tutorials		

Course Outcome (CO) ACH1201

CO1 To study about types of nuclear fuels/ reactors/ reactions and fuel cells.

CO2 To study about hardness in water, boiler feed water and various methods employed to remove hardness.

CO3 To study about the different types of corrosion and their prevention.

CO4 To study about the manufacturing process, properties and applications of glass and cements.

CO5 To study about manufacturing of caustic, chlorine and soda ash.

CO6 To study about manufacturing of sulfuric acid and ammonia.

CO7 To study about order/ molecularity of the reactions and application of law of mass action to homogeneous equilibria.

CO8 To learn about the chemistry of various aliphatic compounds with respect to their preparation, properties and uses.

Unit	**Topic/Unit**	**Contact**	**Weightage**	**BT**	**CO**	**PSO**	**Element s of**	**Relevan ce to**	**Relation to**

No.		Hours	(%)	Level			Employability (Emp)/ Entrepreneurship (Ent)/ Skill Development (SD)	Local (L)/ National (N)/ Regional (R)/Global (G) developmental needs	Gender (G), Environment and Sustainability (ES), Human Values (HV)and Professional Ethics (PE)
1.	**Nuclear Industries:** Nuclear reactions (fission & fusion reactions); nuclear fuels: processing of nuclear materials, nuclear reactors, breeder reactor. fuel cells	06	13	1,2,3,4	CO1	PSO1	Emp	G	ES, HV
2.	**Water Industry:** impurities in water, boiler feed water, scale formation and its prevention; methods for softening of water; membrane processes and electro dialysis.	07	14	1,2	CO2	PSO1			
3.	**Corrosion:** Types of corrosion; it prevention; protective coatings: metallic coatings, paints (types of paints) miscellaneous coatings; passivity.	05	11	1,2,3	CO3	PSO1			
4.	**Cement and Glass:** Manufacturing process, properties and uses.	06	13	2,3,4	CO4	PSO1			
5.	**Chlor-alkali Industry:** Manufacturing of NaOH (electrolyte membrane method): manufacturing of chlorine, manufacturing of soda ash	06	12	1,2,3	CO5	PSO1			
6.	**Heavy Chemicals:** Manufacturing of sulfuric acid; manufacturing of ammonia.	05	11	1,2,3	CO6	PSO1			
7.	**Chemical kinetics and Chemical equilibrium:** Order and	07	14	2,3	CO7	PSO1			

	molecularity, first and second order reactions, applications of the law of mass action to homogeneous equilibria.								
8.	**Organic chemistry:** Introduction to different functional groups, nomenclature, preparation, properties and uses of alkanes, alkenes, alkynes and alkyl halides.	06	12	2,3	CO8	PSO1			
Reference Books:									
1.	Engineering Chemistry: Jain and Jain, Dhanpat Rai Publishing House								
2.	Industrial Chemistry: B. K. Sharma, Goel Publishing House								
3.	Essentials of Physical Chemistry: B. S. Bahl, A. Bahl and G. D. Tuli; S Chand & Co.								

	The Maharaja Sayajirao University of Baroda **Faculty Technology and Engineering** **Department of Applied Chemistry**	**Academic Year**	**2020-21**

BE-I (Chemical Engineering): Regular Programme

Year	**I**	**Core / ~~Elective / Foundation~~** **ACH1201L:** Applied Chemistry-TW/Practical/Viva	**Credits / Hours per week**	**02**
Semester	**I**	Year of Syllabus Revision: 2009	**Maximum Marks / Grade**	**50**
Mode of Transaction		Term work, Practical and Viva		

Course Outcome (CO) ACH1201L

CO1 To determine the strength and normality of an unknown analyte by performing a redox titration.

Unit No.	Topic/Unit	Contact Hours	Weightage (%)	BT Level	CO	PSO	Elements of Employability (Emp)/ Entrepreneurship (Ent)/ Skill Development (SD)	Relevance to Local (L)/ National (N)/ Regional (R)/Global (G) developmental needs	Relation to Gender (G), Environment and Sustainability (ES), Human Values (HV)and Professional Ethics

									(PE)
1.	To determine the strengths and normalities of $KMnO_4$ and $FeSO_4.7H_2O$ solutions using a standard solution of Oxalic acid.	03	13	1,2,4	CO1	PSO1	Emp	G	HV
2.	To determine the strengths and normalities of $KMnO_4$ and $FeSO_4(NH_4)_2SO_4.6H_2O$ solutions using a standard solution of Oxalic acid.	03	13	1,2,4	CO1	PSO1			
3.	To determine the strengths and normalities of $KMnO_4$ and H_2O_2 solutions using a standard solution of Oxalic acid.	03	12	1,2,4	CO1	PSO1			
4.	To determine the strengths and normalities of $KMnO_4$ and $NaNO_2$ solutions using a standard solution of Oxalic acid.	03	13	1,2,4	CO1	PSO1			
5.	To determine the strength and normality of I_2 solution against a standard solution of $Na_2S_2O_3$.	03	12	1,2,4	CO1	PSO1			
6.	To determine the strengths and normalities of I_2 and $CuSO_4.5H_2O$ solutions using a standard solution of $Na_2S_2O_3$.	03	13	1,2,4	CO1	PSO1			
7.	To determine the strengths and normalities of I_2 and Na_3AsO_3 solutions using a standard solution of $Na_2S_2O_3$.	03	12	1,2,4	CO1	PSO1			
8.	To determine the strength and normality of $CaOCl_2$ solution against a standard solution of $Na_2S_2O_3$.	03	12	1,2,4	CO1	PSO1			
Reference Books:									
1.	Vogel's Textbook of Quantitative Chemical Analysis -J. Mendham, R. C. Denney, J. D. Barnes and M. J. K. Thomas, (6^{th} edition, Prentice Hall) 2000.								

	The Maharaja Sayajirao University of Baroda **Faculty Technology and Engineering** **Department of Applied Chemistry**	**Academic Year**	**2020-21**

BE-I (Metallurgy): Regular Programme

Year	**I**	**Core / ~~Elective / Foundation~~** **ACH1201: Applied Chemistry**	**Credits / Hours per week**	**04**
Semester	**II**	Year of Syllabus Revision: 2009	**Maximum Marks / Grade**	**100**
Mode of Transaction		Lectures and Tutorials		

Course Outcome (CO) ACH1201

CO1 To learn about basics of phase rule and to construct and analysis of phase diagrams with respect to one and two component systems.

CO2 To learn about various physical properties of molecules.

CO3 To understand the common themes running through metallic descriptions of chemical bonding, imperfections in solids and lattice defects.

CO4 To learn about various types of alloys and their uses.

CO5 To explore the basics of various metallurgical processes/extractions of metals to solve metallurgical and materials engineering issues.

CO6 To learn about various types of corrosion, their prevention together with types of coating techniques.

CO7 To learn about the chemistry of various aliphatic compounds with respect to their preparation, properties and uses.

Unit No.	**Topic/Unit**	**Contact Hours**	**Weightage (%)**	**BT Level**	**CO**	**PSO**	**Elements of** Employability	**Relevance to** Local (L)/	**Relation to** Gender (G),

							(Emp)/ Entrepreneurship (Ent)/ Skill Development (SD)	National (N)/ Regional (R)/Global (G) development mental needs	Environment and Sustainability (ES), Human Values (HV)and Professional Ethics (PE)
1.	**Phase rule**: Phase rule and its applications to one and two component systems	06	13	1,2,3	CO1	PSO1	Emp	G	ES
2.	**Physical properties of molecules**: Surface tension, viscosity, refractive index, optical rotation.	06	13	1,2	CO2	PSO1			
3.	**Metals**: Chemical bonding, types, metallic bonds and structure, metallic properties, Imperfections in solids, lattice defects, application of X-ray to metallic structure.	07	14	1,2	CO3	PSO1			
4.	**Alloys**: Alloys, types and their structure	04	09	2,3	CO4	PSO1			
5.	**Chemistry of metallurgical processes**: Froth flotation process, chemical and electric reduction, Goldsmith thermite process, specialized techniques (electro refining, zone refining, Van Arkel's process).	07	14	1,2,4	CO5	PSO1			
6.	**Typical extractions**: Extraction of beryllium, uranium, platinum group metals; isolation of noble gases from atmosphere.	05	10	1,2,4	CO5	PSO1			
7.	**Corrosion and passivity**: Types of corrosion, its prevention; protective coatings: metallic coatings, paints (types of paints), miscellaneous coatings; passivity.	06	13	1,2	CO6	PSO1			
8.	**Organic Chemistry**: Introduction to different functional groups, nomenclature. Preparation, properties and uses of alkanes, alkenes, alkynes and alkyl halides.	07	14	1,2,3	CO7	PSO1			

Reference Books:	
1.	Engineering Chemistry: Jain and Jain, Dhanpatrai Publishing House
2.	Industrial Chemistry: B. K. Sharma, Goel Publishing House
3.	Essentials of Physical Chemistry: B. S. Bahl, A. Bahl and G. D. Tuli; S Chand & Co.
4.	Organic Chemistry: Morrison and Boyd, Prentice-Hall of India Ltd. New Delhi.
5.	Text book of Organic Chemistry for B.Sc. Students: P. L. Soni.

	The Maharaja Sayajirao University of Baroda **Faculty Technology and Engineering** **Department of Applied Chemistry**	**Academic Year**	**2020-21**

BE-I (Metallurgy): Regular Programme

Year	**I**	**Core / ~~Elective / Foundation~~** **ACH1201L:** Applied Chemistry-TW/Practical/Viva	**Credits / Hours per week**	**02**
Semester	**II**	Year of Syllabus Revision: 2009	**Maximum Marks / Grade**	**50**
Mode of Transaction		Term work, Practical and Viva		

Course Outcome (CO) ACH1201L

CO1 To determine the strength and normality of an unknown analyte by performing a redox titration.

Unit No.	Topic/Unit	Contact Hours	Weightage (%)	BT Level	CO	PSO	Elements of Employability (Emp)/ Entrepreneurship (Ent)/ Skill Development (SD)	Relevance to Local (L)/ National (N)/ Regional (R)/Global (G) developmental needs	Relation to Gender (G), Environment and Sustainability (ES), Human Values (HV)and Professional Ethics

									(PE)
1.	To determine the strengths and normalities of $KMnO_4$ and $FeSO_4.7H_2O$ solutions using a standard solution of Oxalic acid.	03	13	1,2,4	CO1	PSO1	Emp	G	HV
2.	To determine the strengths and normalities of $KMnO_4$ and $FeSO_4(NH_4)_2SO_4.6H_2O$ solutions using a standard solution of Oxalic acid.	03	13	1,2,4	CO1	PSO1			
3.	To determine the strengths and normalities of $KMnO_4$ and H_2O_2 solutions using a standard solution of Oxalic acid.	03	12	1,2,4	CO1	PSO1			
4.	To determine the strengths and normalities of $KMnO_4$ and $NaNO_2$ solutions using a standard solution of Oxalic acid.	03	13	1,2,4	CO1	PSO1			
5.	To determine the strength and normality of I_2 solution against a standard solution of $Na_2S_2O_3$.	03	12	1,2,4	CO1	PSO1			
6.	To determine the strengths and normalities of I_2 and $CuSO_4.5H_2O$ solutions using a standard solution of $Na_2S_2O_3$.	03	13	1,2,4	CO1	PSO1			
7.	To determine the strengths and normalities of I_2 and Na_3AsO_3 solutions using a standard solution of $Na_2S_2O_3$.	03	12	1,2,4	CO1	PSO1			
8.	To determine the strength and normality of $CaOCl_2$ solution against a standard solution of $Na_2S_2O_3$.	03	12	1,2,4	CO1	PSO1			
Reference Books:									
1.	Vogel's Textbook of Quantitative Chemical Analysis -J. Mendham, R. C. Denney, J. D. Barnes and M. J. K. Thomas, (6^{th} edition, Prentice Hall) 2000.								

ACH 1203L: Chemistry - I -TW/Practical/Viva

	The Maharaja Sayajirao University of Baroda **Faculty Technology and Engineering** **Department of Applied Chemistry**	**Academic Year**	**2021-22**

BE-I (Textile Processing): Regular Programme

Year	**I**	**Core / ~~Elective / Foundation~~** **ACH 1203L**: Chemistry - I -TW/Practical/Viva	**Credits / Hours per week**	**02**
Semester	**II**	Year of Syllabus Revision: 2021	**Maximum Marks / Grade**	**50**
Mode of Transaction		Term work, Practical and Viva		

Course Outcome (CO) ACH 1203L

CO1 To calculate the strength and normality of an unknown analyte by performing a redox titration.

Unit No.	**Topic/Unit**	**Contact Hours**	**Weightage (%)**	**BT Level**	**CO**	**PSO**	**Elements of** Employability (Emp)/ Entrepreneurship (Ent)/ Skill Development (SD)	**Relevance to** Local (L)/ National (N)/ Regional (R)/Global (G)	**Relation to** Gender (G), Environment and Sustainability (ES), Human Values (HV)and Professio
								developmental needs	

									nal Ethics (PE)
1.	To determine the strengths and normalities of $KMnO_4$ and $FeSO_4.7H_2O$ solutions using a standard solution of Oxalic acid.	03	13	1,2,4	CO1	PSO1	Emp	G	HV
2.	To determine the strengths and normalities of $KMnO_4$ and $FeSO_4(NH_4)_2SO_4.6H_2O$ solutions using a standard solution of Oxalic acid.	03	13	1,2,4	CO1	PSO1			
3.	To determine the strengths and normalities of $KMnO_4$ and H_2O_2 solutions using a standard solution of Oxalic acid.	03	12	1,2,4	CO1	PSO1			
4.	To determine the strengths and normalities of $KMnO_4$ and $NaNO_2$ solutions using a standard solution of Oxalic acid.	03	13	1,2,4	CO1	PSO1			
5.	To determine the strength and normality of I_2 solution against a standard solution of $Na_2S_2O_3$.	03	12	1,2,4	CO1	PSO1			
6.	To determine the strengths and normalities of I_2 and $CuSO_4.5H_2O$ solutions using a standard solution of $Na_2S_2O_3$.	03	13	1,2,4	CO1	PSO1			
7.	To determine the strengths and normalities of I_2 and Na_3AsO_3 solutions using a standard solution of $Na_2S_2O_3$.	03	12	1,2,4	CO1	PSO1			
8.	To determine the strength and normality of $CaOCl_2$ solution against a standard solution of $Na_2S_2O_3$.	03	12	1,2,4	CO1	PSO1			

Reference Books:

1.	Vogel's Textbook of Quantitative Chemical Analysis -J. Mendham, R. C. Denney, J. D. Barnes and M. J. K. Thomas, (6^{th} edition, Prentice Hall) 2000.