



COURSE FILE 2020-21

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VISION OF THE INSTITUTION

To produce professionally excellent, knowledgeable, globally competitive and socially responsible engineers and entrepreneurs

MISSION OF THE INSTITUTION

- M1** To provide quality education in engineering and Management
- M2** To establish a continuous industry-institute interaction, participation and collaboration to contribute skilled engineers
- M3** To develop human values, social values, entrepreneurship skills and professional ethics among technocrats
- M4** To focus on innovation and development of technologies by engaging in cutting edge research areas



RAO BAHADUR Y. MAHABALESWARAPPA ENGINEERING COLLEGE, BELLARY
Department of Chemistry



COURSE DESIGN, DELIVERY AND ASSESMENT

Staff Name: Dr. KOTTURESHWARA N.M	Semester: I	Sec: F
Course Name: Engineering Chemistry	Course Code: C110	Total contact hours: 50
Checked by: HOD	Date of preparation: 01.10.2021	
Prerequisites: Basic knowledge of physical, environmental & inorganic chemistry		

Staff Name	Signature	Date
Dr. KOTTURESHWARA N.M		11/10/2021
Course Coordinator	Signature	Date
M.Jayashree		11/10/2021

Head of Department
(Sign & Date)

Audited by

(Dr. D. Nagesh Sathya)

(Dr. G. Rajalhekhar)





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COURSE PLAN 2020-2021

Sl.No.	Unit Name	Hours Required	Assessment Strategy
01	Electrochemistry and Energy Storage System	10	IA, A & FE
02	Corrosion & Metal Finishing	10	IA, A & FE
03	Energy System	10	IA, A & FE
04	Environmental pollution and Water Chemistry	10	IA, A & FE
05	Instrumental methods of analysis and Nano materials	10	IA, A & FE

Assessment Strategy:

Assignment	I.A Test ✓	Final Exam ✓	Seminar
Mention if any other required:			





Teaching and Learning Tools: Blackboard/PowerPoint presentation/ webinar/lab

Resources:

Text Books:

1. B.S. Jai Prakash, R.Venugopal, Sivakumaraiah & Pushpa Iyengar., "Chemistry for Engineering Students", Subhash Publication, Bangalore.
2. R.V.Gadag & A.Nityananda Shetty., "Engineering Chemistry", I K International Publishing House Private Ltd. New Delhi

Contents beyond Syllabus:

1. Origin of electrode potential
2. Tinning
3. Construction and working of hydrogen-oxygen fuel cell
4. Determination of DO by Winkler's method
5. Syntheses of nanomaterials by gas condensation method.

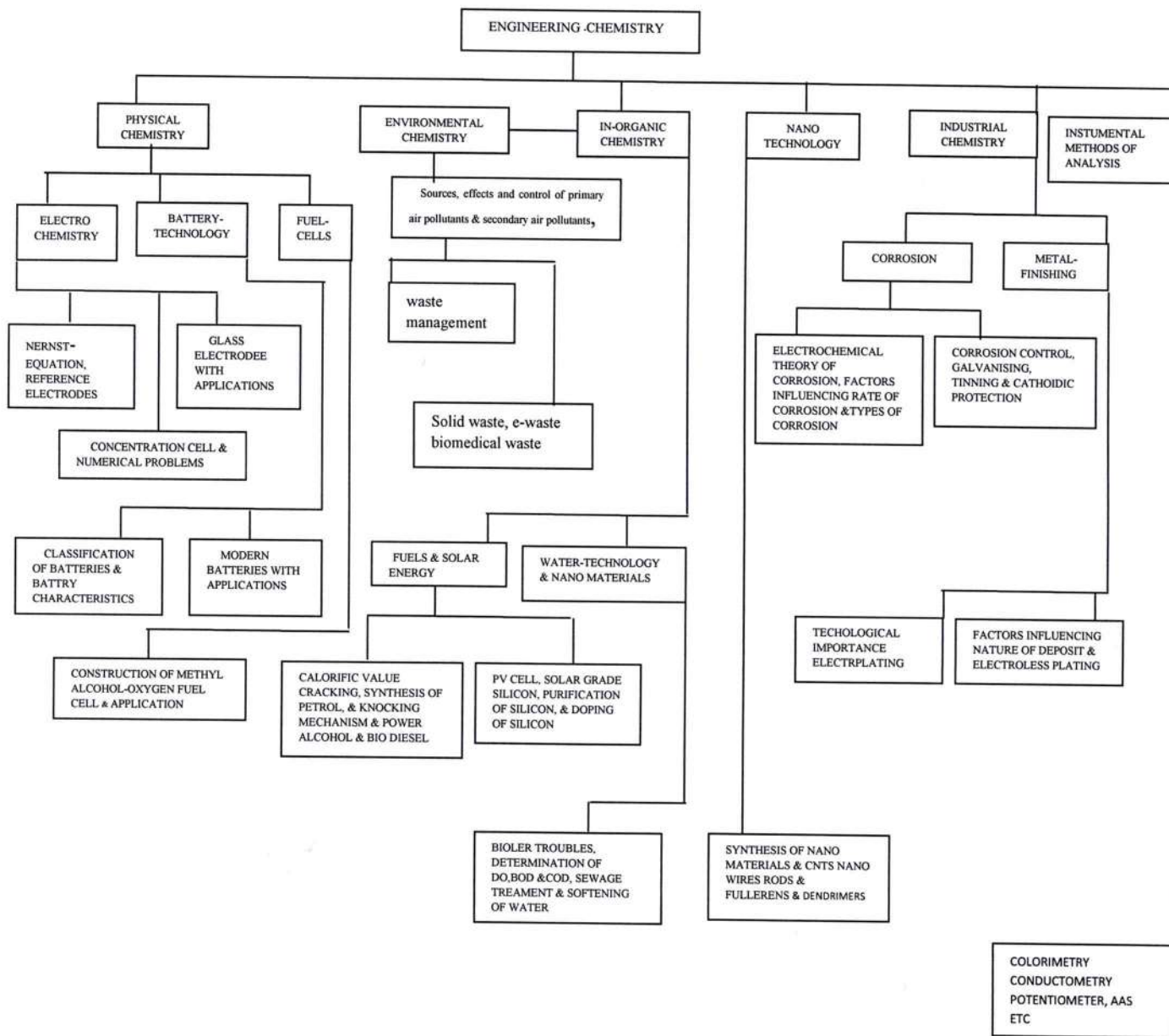
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Signature of Course Coordinator



CONCEPT MAP

(Example: Course -Complier Design)





COURSE OUTCOMES 2020-21

COURSE OUTCOME	DESCRIPTION Students will have the
C110.1	Knowledge in use of free energy in equilibria rationalizes bulk properties and processes using thermodynamic consideration electrochemical energy system and energy system.
C110.2	Knowledge in, causes and effects of corrosion of metals and control of corrosion. Modifications of surface properties of metals to develop resistance to corrosion, wear, tear impact etc. by electroplating and electro less plating.
C110.3	Knowledge in Production and consumption for industrialization of country and living standards of people. Utilization of solar energy for different useful forms of energy.
C110.4	Knowledge in environmental pollution, waste management and water chemistry. Different techniques of instrumental methods of analysis. Fundamental principles of nonmaterial's

CO-PO-MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C110.1	3	2										
C110.2	3	2										
C110.3	3	2										
C110.4	3	2										
AVERAGE	3	2										

***Note:** - 1.Slight (Low)

2.Moderate (Medium)

3.Substantial (High).



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PO's addressed by CO's												
CO	1	2	3	4	5	6	7	8	9	10	11	12
C110.1	09	01hr										
C110.2	09	01hr										
C110.3	09	01hr										
C110.4	18	02hr										
Percent mapping of PO's												
CO	Programme Outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
C110.1	90%	10%										
C110.2	90%	10%										
C110.3	90%	10%										
C110.4	90%	10%										
Range of Percentage of mapping level												
Level 1						⇒		5%-9%				
Level 2						⇒		10%-25%				
Level 3						⇒		26% and above				

Justification method adopted to measure the level of mapping	
Sl.No	Justification
1	Contribution of C110.1 towards PO1 and PO2 are 9hours and 1hours respectively. Total number of hours or sessions taught PO1 and PO2 are 10 hours, hence the contribution for PO1 and PO2 are 90% and 10% respectively. Therefore, mapping level for PO1 is 3 and for PO2 is 2.
2	Contribution of C110.2 towards PO1 and PO2 are 9hours and 1hours respectively. Total number of hours or sessions taught PO1 and PO2 are 10 hours, hence the contribution for PO1 and PO2 are 90% and 10% respectively. Therefore, mapping level for PO1 is 3 and for PO2 is 2.
3	Contribution of C110.3 towards PO1 and PO2 are 9hours and 1hours respectively. Total number of hours or sessions taught PO1 and PO2 are 10 hours, hence the contribution for PO1 and PO2 are 90% and 10% respectively. Therefore, mapping level for PO1 is 3 and for PO2 is 2.
4	Contribution of C110.4 towards PO1 and PO2 are 18hours and 2hours respectively. Total number of hours or sessions taught PO1 and PO2 are 20 hours, hence the contribution for PO1 and PO2 are 90% and 10% respectively. Therefore, mapping level for PO1 is 3 and for PO2 is 2.



STRENGTH OF CO-PO-MAPPING

CO	PO	BTL	No of hrs/session delivered
C110.1	PO1,PO2	Remembering, Understanding and Applying (L1,L2 & L3)	10 of 50
C110.2	PO1,PO2	Remembering, Understanding and Applying (L1 & L2)	10 of 50
C110.3	PO1,PO2	Remembering, Understanding and Applying (L1,L2 & L3)	10 of 50
C110.4	PO1,PO2	Remembering, Understanding and Applying (L1,L2 & L3)	20 of 50

CO-PO INDICATOR MATRIX

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C110.1	IA,A & FE	IA,A & FE												
C110.2	IA,A & FE	IA,A & FE												
C110.3	IA,A & FE	IA,A & FE												
C110.4	IA,A & FE	IA,A & FE												

*Note: - Indicators are Internal Assessment =IA, Final Exam=FE, Assignment=A



PERIODIC LESSON PLAN 2020-2021

Module No	Topic to be covered	Topic Learning outcome (TLO) Students are	Hrs
1	1.01 Electrochemistry Use of free energy in chemical equilibria: Thermodynamic functions: Definition of free energy and entropy. Cell potential	Able to understand Definition of free energy and entropy. Cell potential	01
	1.02 Derivation of Nernst equation for single electrode potential	Able to use Nernst equation in solving problems	01
	1.03 Numerical problems on E, E^0 and E_{cell}	Able to use Nernst equation in solving problems	01
	1.04 Electrochemical system: Reference electrodes: Introduction; construction, working and applications of calomel electrode	Able to understand reference electrodes Working of calomel electrode and silver-silver chloride electrode	01
	1.05 Ion selective electrode: definition Construction and principle of glass electrode,	Able to understand the working mechanism of glass electrode	01
	1.06 Determination of pH by using glass electrode	Able to know method of determine pH of a solution using glass electrode	01
	1.07 Electrolyte concentration cell, Numerical problems on electrolyte concentration cell.	Able to illustrate the electrolyte concentration cell & solve the problems	01
	1.08 Energy Storage System: Introduction, classification - primary, secondary and reserve batteries.	Able to classify the batteries	01
	1.09 Construction, working and applications of, Nickel- metal hydride batteries.	Able to know the active materials and electrolyte ; mechanism of working and their uses of and Nickel-metal hydride battery	01
	1.10 Construction, working and applications of Li-ion batteries	Able to know the active materials and electrolyte ; mechanism of working and their uses Li-ion battery	01
	1.11 Tutorial class		
	1.12 Tutorial class		
2	Corrosion:2.01 Introduction, electrochemical theory of corrosion,	Able to understand the reactions involved in the corrosion process Passivity of metal	01
	2.02 Factors affecting the rate of corrosion: ratio of anodic to cathodic areas, nature of metal, nature of corrosion product, nature of medium – pH, conductivity and temperature.	Able to understand how several factors influencing the corrosion rate	01
	2.03 Types of corrosion- Differential metal corrosion,	Able to understand the different methods of corrosion	01
	2.04 Differential aeration corrosion (Pitting and water line)	Able to understand the different methods of corrosion	01



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	2.05 Corrosion control: Inorganic coatings- Anodizing of Al Metal coatings- Galvanization.	Able to understand the methods of preventing the corrosion rate	01
	2.06 Cathodic protection - Sacrificial anodic and impressed current methods).	Able to understand the methods of preventing the corrosion rate	01
	METAL FINISHING: 2.07 Introduction, Technological importance. Electroplating: Introduction, principles governing- Polarization, decomposition potential and overvoltage.	Able to understand the maintenance of suitable conditions in order to get good deposit	01
	2.08 Electroplating of Chromium (Decorative and Hard).	Able to explain the process of Electroplating of chromium	01
	2.09 Electro less plating: Introduction, Electro less plating of Nickel	Able to explain the metal finishing process without using electric current	01
	2.10 Electro less plating of copper, Distinction between electroplating and electro less plating,	Able to explain difference between electroplating and electro less plating,	01
	2.11 Tutorial class		
	2.12 Tutorial class		
3	3.01 Energy system: Chemical Fuels: Introduction, classification, definitions of calorific value, low calorific value(LCV) and high calorific value(HCV)	Able to define calorific value of a fuel and to classify into GCV and NCV.	01
	3.02 Determination of calorific value of solid/liquid fuel using bomb calorimeter	Able to determine the CV of a fuel using bomb calorimeter.	01
	3.03 Numerical problems	Able to solve numerical problems on GCV and NCV	01
	3.04 Knocking of petrol engine- Definition, mechanism, ill effects and prevention	Able to understand gasoline and their mechanism	01
	3.05 Unleaded petrol, power alcohol and biodiesel.	Able understand the concepts of unleaded petrol, power alcohol, biodiesel	01
	3.06 Fuel Cells: Introduction, difference between conventional cell and fuel cell, limitations & advantages.	Able to classify fuel cells and how it differs from conventional battery, limitations and advantages of fuel cells	01
	3.07 Construction & working of methanol-oxygen fuel cell with H_2SO_4 as an electrolyte.	Able to know the working mechanism of methanol-oxygen fuel cell	01
	3.08 Construction & working of solid oxide fuel cell(SOFCs)	Able to know the working mechanism of solid oxide fuel cell(SOFCs)	01
	3.09 Solar Energy: Photovoltaic cells- introduction, Construction and working of a typical PV cell. Advantages & Disadvantages of PV cells.	Able to understand the parts and working process of PV cell with its advantages and disadvantages	01
	3.10 Preparation of solar grade silicon by Union Carbide Method.	Able to understand the production of solar grade silicon by union carbide Method.	01
	3.11 Tutorial class		
	3.12 Tutorial class		



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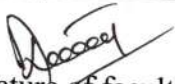
4	4.01 Environmental pollution: Air pollutants: sources, effects and control of primary air pollutants. Carbon monoxide, Oxides of nitrogen and sulphur,	Able to understand the sources, effects and control of primary air pollutants. Carbon monoxide, Oxides of nitrogen and sulphur,	01
	4.02 Hydrocarbons, Particulate matter, Mercury and Lead	Able to understand the sources, effects and control of Hydrocarbons, Particulate matter, Mercury and Lead	01
	4.03 Secondary air pollutants: Ozone, Ozone depletion.	Able to understand the sources, effects and control of Ozone, Ozone depletion.	01
	4.04 Waste Management: Sources, characteristics and disposal methods Solid waste, e-waste	Able to understand the Sources, characteristics and disposal methods Solid waste, e-waste	01
	4.05 Biomedical waste: (Scientific land filling, composting, recycling and reuse.)	Able to understand the Sources, characteristics and disposal methods Biomedical waste.	01
	4.06 Water Chemistry: Introduction, Sources, impurities in water, boiler feed water, boiler troubles with disadvantages-scale and sludge formation, boiler Corrosion (due to dissolved O ₂ , CO ₂ and MgCl ₂).	Able to understand the boiler feed water and concept of boiler troubles with its disadvantages, scale and sludge formation. and boiler Corrosion (due to dissolved O ₂ , CO ₂ and MgCl ₂).	01
	4.07 Sources water pollution sewage, definition of BOD and COD, determination of COD, numerical problems on COD	Able to understand the definitions of BOD and COD determination of COD and numerical problems on COD	01
	4.08 Chemical analysis of water: Sulphates (gravimetry) and Fluoride (colorimetry)	Able to understand estimation of Sulphates (gravimetry) and Fluoride (colorimetry)	01
	4.09 Sewage treatment: Primary, secondary (activated sludge method) and tertiary methods.	Able to understand the Sewage treatment	01
	4.10 Softening of water by ion exchange process. Desalination of sea water by reverse osmosis method	Able to understand Softening of water by ion exchange process and Desalination of sea water by reverse osmosis method.	01
	4.11 Tutorial class		
	4.12 Tutorial class		
5	5.01 Instrumental methods of analysis: Theory, Instrumentation and applications of colorimetry	Able to understand Theory, Instrumentation and applications of colorimetry	01
	5.02 Flame photometry	Able to understand Theory Instrumentation and applications Flame photometry	01
	5.03 Atomic absorption spectroscopy	Able to understand Theory Instrumentation and applications of Atomic absorption spectroscopy	
	5.04 Potentiometry	Able to understand Theory Instrumentation and applications of Potentiometry	01
	5.05 Conductometry (strong acid with strong base, weak acid with strong base)	Able to understand Theory Instrumentation and applications of Conductometry	01
	5.06 mixture of strong acid and weak acid with strong base)	Able to understand Theory Instrumentation and applications of Conductometry	01
	5.07 Nano Materials: Introduction, size dependent properties surface area,	Able to define nonmaterial and can list the properties of it	01



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	Electrical, Optical and Thermal properties		
	5.08 Synthesis-of nano materials top down and bottom up approach, Synthesis by Sol-gel	Able to understand the various synthesis process of nonmaterial's	01
	5.09 Precipitation and chemical vapour deposition	Able to understand the various synthesis process of nonmaterial's	01
	5.10 Nano scale materials- Fullerenes carbon nano tube and graphenes- properties and applications	Able to understand the properties and applications of nano scale materials	01
	5.11 Tutorial class		
	5.12 Tutorial class		


Signature of faculty


Signature of HOD

Note: Lesson planning is a teacher's detailed description of the course of instruction or learning trajectory for lesson. A daily lesson plan is developed by teacher to guide class learning. Topic learning outcome shall be tabulated based on blooms taxonomy.



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CONTENTS DELIVERED REPORT (2020-21)

Course owner: Dr.Kottureshwara.N.M		Sem: I	Sec: F	
Course Name: Engineering Chemistry		Course Code: C110	Date: 1-1-2021	
Date (DD/MM/YY) From -T0	TLO	BTL	CO	remarks
11-1-2021	Able to understand Definition of free energy and entropy. Cell potential	L2	C110.1	
12-1-2021	Able to use Nernst equation in solving problems	L1&L3	C110.1	
13-1-2021	Able to use Nernst equation in solving problems	L3	C110.1	
15-1-2021	Able to understand reference electrodes Working of calomel electrode and silver-silver chloride electrode	L1 & L2	C110.1	
16-1-2021	Able to understand the working mechanism of glass electrode	L1 & L2	C110.1	
19-1-2021	Able to know method of determine pH of a solution using glass electrode	L1 & L2	C110.1	
20-1-2021	Able to illustrate the electrolyte concentration cell & solve the problems	L1 & L3	C110.1	
21-1-2021	Able to classify the batteries	L1 & L2	C110.1	
22-1-2021	Able to know the active materials and electrolyte ; mechanism of working and their uses of and Nickel-metal hydride battery	L1 & L2	C110.1	
22-1-2021	Able to know the active materials and electrolyte ; mechanism of working and their uses of Li-ion battery	L1 & L2	C110.1	
23-1-2021	(First Slip Test Conducted)	Tutorial Class		
23-1-2021	(Discussion of Question Papers of previous semesters)	Tutorial Class		
Contents Beyond Syllabus : Origin of electrode potential				



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Course owner: Dr.Kottureshwara.N.M		Sem: I	Sec: F	
Course Name: Engineering Chemistry		Course Code: C110	Date: 1-1-2021	
Date (DD/MM/Y) From -T0	TLO Students are	BTL	CO	remarks
25-1-2021	Able to understand the reactions involved in the corrosion process Passivity of metal	L1 & L2	C110.2	
27-1-2021	Able to understand how several factors influencing the corrosion rate	L2	C110.2	
01-2-2021	Able to understand the different methods of corrosion	L1 & L2	C110.2	
02-2-2021	Able to understand the different methods of corrosion	L1 & L2	C110.2	
03-2-2021	Able to understand the methods of preventing the corrosion rate	L1 & L2	C110.2	
03-2-2021	Able to understand the methods of preventing the corrosion rate	L1 & L2	C110.2	
04-2-2021	Able to understand the maintenance of suitable conditions in order to get good deposit	L2	C110.2	
04-2-2021	(Second Slip Test Conducted)	Tutorial Class		
05-2-2021	Able to explain the process of Electroplating of chromium	L2	C110.2	
05-2-2021	Able to explain the metal finishing process without using electric current	L1 & L2	C110.2	
06-2-2021	Able to explain difference between electroplating and electro less plating,	L2	C110.2	
06-2-2021	(Discussion of Question Papers of previous semesters)	Tutorial Class		
Contents Beyond Syllabus Tinning				



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Course owner: Dr.Kottureshwara.N.M		Sem: I	Sec: F	
Course Name: Engineering Chemistry		Course Code: C110	Date: 1-1-2021	
Date (DD/MM/YY) From –T0	TLO Students are	BTL	CO	remarks
08-2-2021	Able to define calorific value of a fuel and to classify into GCV and NCV.	L1 & L2	C110.3	
08-2-2021	Able to determine the CV of a fuel using bomb calorimeter.	L2 & L3	C110.3	
9-2-2021	Able to solve numerical problems on GCV and NCV	L1 & L3	C110.3	
10-2-2021	(Third Slip Test Conducted)	Tutorial Class		
10-2-2021	Able to understand gasoline and their mechanism	L1 & L2	C110.3	
11-2-2021	Able understand the concepts of unleaded petrol, power alcohol, biodiesel	L1& L2	C110.3	
12-2-2021	Able to classify fuel cells and how it differs from conventional battery, limitations and advantages of fuel cells	L2	C110.3	
12-2-2021	Able to know the working mechanism of methanol-oxygen fuel cell	L1 & L2	C110.3	
15-2-2028	Able to know the working mechanism of solid oxide fuel cell (SOFCs)	L2	C110.3	
16-2-2021	Able to understand the parts and working process of PV cell with its advantages and disadvantages	L2	C110.3	
17-2-2021	Able to understand the production of solar grade silicon by union carbide Method.	L2	C110.3	
17-2-2021	(Fourth Slip Test Conducted)	Tutorial Class		
Contents Beyond Syllabus: Construction and working of hydrogen-oxygen fuel cell				



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Department of Engineering Chemistry



Course owner: Dr.Kottureshwara.N.M		Sem: I	Sec: F	
Course Name: Engineering Chemistry		Course Code: C110	Date: 1-1-2021	
Date (DD/MM/Y) From –T0	TLO Students are	BTL	CO	remarks
18-2-2021	Able to understand the sources, effects and control of primary air pollutants. Carbon monoxide, Oxides of nitrogen and sulphur	L1 & L2	C110.4	
19-2-2021	Able to understand the sources, effects and control of Hydrocarbons, Particulate matter, Mercury and Lead	L1&L2	C110.4	
20-2-2021	Able to understand the sources, effects and control of Ozone, Ozone depletion.	L1&L2	C110.4	
22-2-2021	Able to understand the Sources, characteristics and disposal methods Solid waste, e-waste	L1&L2	C110.4	
23-2-2021	Able to understand the Sources, characteristics and disposal methods Biomedical waste.	L1 & L2	C110.4	
24-2-2021	(Fifth Slip Test Conducted)	Tutorial Class		
26-2-2021	Able to understand the boiler feed water and concept of boiler troubles with its disadvantages, scale and sludge formation. Boiler Corrosion (due to dissolved O ₂ , CO ₂ and MgCl ₂).	L1&L2	C110.4	
4-3-2021	Able to understand the definitions of BOD and COD determination of COD and numerical problems on COD	L1 & L3	C110.4	
5-3-2021	Able to understand estimation of Sulphates (gravimetry) and Fluoride (colorimetry)	L1& L2	C110.4	
6-3-2021	Able to understand the Sewage treatment	L1 & L2	C110.4	
8-3-2021	Able to understand Softening of water by ion exchange process and Desalination of sea water by reverse osmosis method.	L1&L2	C110.4	
9-3-2021	Discussion of question papers	Tutorial Class		
Contents Beyond Syllabus: Determination of DO by Winkler's method				



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Course owner: Dr.Kottureshwara.N.M		Sem: I	Sec: F	
Course Name: Engineering Chemistry		Course Code: C110	Date: 1-1-2021	
Date (DD/MM/Y) From –T0	TLO Students are	BTL	CO	rema rks
10-3-2021	Able to understand Theory, Instrumentation and applications of colorimetry	L1&L2	C110.4	
12-3-2021	Able to understand theory, instrumentation and applications of Flame photometry	L2	C110.4	
13-3-2021	(Sixth Slip Test Conducted)	Tutorial Class		
15-3-2021	Able to understand theory, instrumentation and applications of Atomic absorption spectroscopy	L2	C110.4	
16-3-2021	Able to understand theory, instrumentation and applications of Potentiometry	L2 & L3	C110.4	
18-3-2021	Able to understand theory, instrumentation and applications of Conductometry	L1&L2	C110.4	
20-3-2021	(Seventh Slip Test Conducted)	Tutorial Class		
22-3-2021	Able to define nonmaterial and can list the properties of it	L1&L2	C110.4	
23-3-2021	Able to understand the various synthesis process of nonmaterial's	L1&L2	C110.4	
24-3-2021	Able to understand the various synthesis process of nonmaterial's	L1	C110.4	
25-3-2021	Able to understand the properties and applications of nanoscale materials	L1 & L2	C110.4	
30-3-2021	Discussion of question papers	Tutorial Class		
Contents Beyond Syllabus Syntheses of nanomaterials by gas condensation method				



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COURSE ASSESSMENT AND EVALUATION SCHEME

THEORY AND LAB

	What		To Whom	When/ Where (Frequency in the course)	Max Marks	Evidence Collected	Contribution to Course Outcomes
Direct Assessment Methods	IA	Internal Assessment Tests	Students	Thrice(Average of the three will be computed)	40	Blue Books	1,2,3& 4
		Practical Assessment		once	40	Practical evaluation	1,2,3& 4
	FE	Final Examination		End of Course (Answering 5 of 10 questions)	60	Result sheet	1,2,3 & 4
		Practical Examination		Two question from lot	60	Result sheet	1,2,3 & 4
Indirect Assessment Methods	Students Feedback		Students	End of the course	-	Questionnaire	1,2,3 & 4 Effectiveness of Delivery of instructions & Assessment Methods
	Course Exit Survey						

Questions for IA and FE will be designed to evaluate the various educational components (Bloom's taxonomy)


Signature of faculty


HOD Signature



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INTERNAL ASSESSMENT TEST-I (2020-21)

Course owner: Dr.Kottureshwara.N.M	Sem: I	Sec: F
Course Name: Engineering Chemistry	Course Code: C110	Duration 1Hr-15min
Faculty: Dr.Kottureshwara.N.M	Checked by:	Max.Marks:30

Q No	QUESTIONS	Marks	BTL	CO	PO
1	Explain how you relate electrode potential of an electrode and concentration activity of the metal ion. (Nernst Equation). OR	6	L2	1	1
2	Explain the construction and working of Calomel electrode with a neat diagram and mention its applications.	6	L2	1	1
3	A cell consists of copper rod immersed in 5M CuSO ₄ solution and an iron rod immersed in 0.05M FeSO ₄ solution. Given $E^{\circ}_{Cu} = +0.34V$ and $E^{\circ}_{Fe} = -0.44V$. Write the cell representation, cell reactions and Calculate the EMF of the cell at 25°C. OR	6	L3	1	2
4	A concentration cell was constructed by immersing two cadmium electrodes in 0.1M & 1.0M CdSO ₄ solution. Write the cell representation, cell reactions and calculate the EMF of the cell at 25°C.	6	L3	1	2
5	Explain method of determining the pH of a given solution using glass electrode with a neat diagram. OR	6	L2	1	1
6	Explain the electrolyte concentration cell by taking suitable example	6	L2	1	1
7	Discuss the working of Ni-MH battery with a neat diagram. Mention its applications OR	6	L2	1	1
8	Explain the classification of batteries with examples	6	L2	1	1
9	Explain the electrochemical theory of corrosion by taking iron as an example. OR	6	L2	2	1
10	Define the term corrosion. Explain the factors affecting the rate of corrosion.	6	L1 & L2	2	1


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RAO BAHADUR Y. MAHABALESWARAPPA ENGINEERING COLLEGE, BELLARY
Department of Engineering Chemistry



INTERNAL ASSESSMENT TEST-II (2020-21)

Course owner: Dr.Kottureshwara.N.M	Sem: I	Sec: F
Course Name: Engineering Chemistry	Course Code: C110	Duration 1Hr-15min
Faculty: Dr.Kottureshwara.N.M	Checked by:	Max. Marks: 30

Q. No	QUESTIONS	Marks	BTL	CO	PO
1	Explain differential aeration corrosion with suitable example (pitting corrosion or water line corrosion). OR	6	L ₂	2	1
2	What is galvanization? Discuss the process of galvanization with neat diagram.	6	L ₁ & L ₂	2	1
3	What is metal finishing? Mention the technological importance of metal finishing OR	6	L ₁ & L ₂	2	1
4	Explain the process of electro less plating of copper	6	L ₂	2	1
5	Define calorific value, Higher calorific value and Lower calorific value of a fuel. OR	6	L ₁	3	1
6	Explain the determination of calorific value of a fuel using bomb calorimeter with a neat diagram.	6	L ₂	3	1
7	0.00080 Kg of fuel sample was completely combusted in excess of oxygen; the increase of temperature of water in a calorimeter containing 1.5 Kg of water was 3.5°C. Calculate the HCV and LCV of the fuel, if water equivalent of calorimeter is 0.50Kg. Given specific heat of water is 4.2 KJ/Kg°C, percentage of hydrogen is 5% and latent heat of steam is 2457KJ/Kg. OR	6	L ₃	3	2
8	0.00075 Kg of fuel was subjected to combustion in a bomb calorimeter. Mass of water taken in calorimeter was 2 Kg and the Water equivalent of calorimeter was 0.75 Kg. The rise in temperature was found to be 3.5°C. Calculate the gross and net calorific values of the sample. Given percentage of hydrogen is 3.8% , latent heat of steam =2454 KJ/Kg and Specific heat of water= 4.187 KJ/kg°C	6	L ₃	3	2
9	Explain the working of CH ₃ OH-O ₂ fuel cell with a neat diagram. OR	6	L ₂	3	1
10	Explain the working of photovoltaic cell with a neat diagram.	6	L ₂	3	1


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Department of Engineering Chemistry



INTERNAL ASSESSMENT TEST-III (2020-21)

Course owner: Dr.Kottureshwara.N.M	Sem: I	Sec: F
Course Name: Engineering Chemistry	Course Code: C110	Duration 1Hr-15min
Faculty: :Dr.Kottureshwara.N.M	Checked by:	Max. Marks:30

Q. No	QUESTIONS	Marks	BTL	CO	PO
1	What are sources, effects and control of carbon monoxide? OR	6	L ₁	4	1
2	What are the sources, characteristics and disposal methods of solid waste?	6	L ₁	4	1
3	What is sewage? Discuss the process of sewage treatment OR	6	L ₁ & L ₂	4	1
4	What is desalination? Discuss the softening of water by ion exchange process with neat diagram	6	L ₁ & L ₂	4	1
5	Define COD. In a COD test 20.0 ml and 15.0 ml of 0.25N FAS solutions are required for a blank and main titration respectively. The volume of test sample used was 25ml. Calculate COD of the water sample. OR	6	L ₁ & L ₃	4	2
6	Define COD. Calculate the COD of the effluent sample when 25cm ³ of the effluent required 8.0 cm ³ of 0.001M K ₂ Cr ₂ O ₇ for oxidation	6	L ₁ & L ₃	4	2
7	Write a note on fullerene OR	6	L ₂	4	1
8	What are nanomaterials? Explain the synthesis of nano materials by sol-gel method.	6	L ₁ & L ₂	4	1
9	Explain the theory, instrumentation and application of conductometric titration of acid mixture (strong acid and weak acid) with strong base OR	6	L ₂	4	1
10	Explain the theory, instrumentation and applications of colorimetry	6	L ₂	4	1


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Department of Engineering Chemistry



SCHEME OF EVALUATION INTERNAL ASSESSMENT TEST-I (2020-21)

Course owner: Dr.Kottureshwara.N.M	Sem: I	Sec: F
Course Name: Engineering Chemistry	Course Code: C110	
Faculty: : Dr.Kottureshwara.N.M	Checked by: HOD	

Q No	SCHEME OF EVALUATION	Marks	BTL	CO	PO
1	Nernst Equation step wise	1+1+1+1+ 1+1+	L2	1	1
2	labelled figure +working + applications	2+2+2	L2	1	1
3	Cell representation+ cell reaction +formula + Substitution + calculation	1+1+1+1+ 2	L3	1	2
4	Cell representation+ cell reaction + formula + Substitution + calculation	1+1+1+1+ 2	L3	1	2
5	Labelled figure+ cell representation + explanation	2+1+3	L2	1	1
6	Diagram + anodic reaction + cathodic reactions + derivation	1+1+1+3	L2	1	1
7	Diagram + electrode reactions + explanation	2+2+2	L2	1	1
8	Primary + Secondary + Reserve batteries	2+2+2	L2	1	1
9	Explanation + anodic+ cathodic reactions	2+1+3	L2	2	1
10	Definition of corrosion + factors influencing the rate of corrosion	2+4	L1 & L2	2	1

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RAO BAHADUR Y. MAHABALESWARAPPA ENGINEERING COLLEGE, BELLARY
Department of Engineering Chemistry



SCHEME OF EVALUATION INTERNAL ASSESSMENT TEST-II (2020-21)

Course owner: Dr.Kottureshwara.N.M	Sem: I	Sec: F
Course Name: Engineering Chemistry	Course Code: C110	
Faculty: : Dr.Kottureshwara.N.M	Checked by:	

Q No	SCHEME OF EVALUATION	Marks	BTL	CO	PO
1	Explanation of differential aeration corrosion + pitting corrosion or water line corrosion as an example	2+4	L ₂	2	1
2	Definition of galvanization + diagram + Explanation	2+2+2	L ₁ & L ₂	2	1
3	Definition of metal finishing + four technological importance of metal finishing	2+4	L ₁ & L ₂	2	2
4	Surface preparation + Bath composition + relevant reactions	2+2+2	L ₂	2	2
5	Definition of calorific value, Higher calorific value and Lower calorific value of a fuel.	2+2+2	L ₁	3	1
6	Labelled diagram + Construction + working and calculation	2+2+2	L ₂	3	1
7	Formula + substitution + HCV& LCV calculation	2+2+2	L ₃	3	1
8	Formula+ substitution + HCV & LCV calculation	2+2+2	L ₃	3	1
9	Labelled diagram of CH ₃ OH-O ₂ fuel cell + explanation+ reactions	2+2+2	L ₂	3	1
10	Labelled diagram of photovoltaic cell + explanation	2+4	L ₂	3	1


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RAO BAHADUR Y. MAHABALESWARAPPA ENGINEERING COLLEGE, BELLARY
Department of Engineering Chemistry



SCHEME OF EVALUATION INTERNAL ASSESSMENT TEST-III (2020-21)

Course owner: Dr.Kottureshwara.N.M	Sem: I	Sec: F
Course Name: Engineering Chemistry	Course Code: C110	
Faculty: : Dr.Kottureshwara.N.M	Checked by: HOD	

Q No	SCHEME OF EVALUATION	Marks	BTL	CO	PO
1	Sources + effects + control of carbon monoxide	2+2+2	L ₁	4	1
2	Sources + characteristics + disposal of solid waste	2+2+2	L ₁	4	1
3	Definition of sewage + primary + secondary + tertiary treatment	2+2+2	L ₁ & L ₂	4	1
4	Definition of desalination of water + diagram + explanation of ion exchange process	2+2+2	L ₁ & L ₂	4	1
5	Definition of COD + Formula + substitution + calculation	2+1+1+2	L ₁ & L ₃	4	2
6	Definition of COD + Formula + substitution + calculation	2+1+1+2	L ₁ & L ₃	4	2
7	Fullerene figure + explanation	2+4	L ₂	4	1
8	Definition of nanomaterials + reactions & explanation of sol-gel process	2+4	L ₂	4	1
9	Explanation of theory + instrumentation + application of conductometry	2+2+2	L ₂	4	1
10	Explanation of theory + instrumentation + application of colorimetry	2+2+2	L ₂	4	1


Signature of faculty


HOD Signature



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Department of Engineering Chemistry



FIRST- IA- PERFORMANCE ANALYSIS

Course owner: Dr.Kottureshwara.N.M	Sem: I	Sec: F
Course Name: Engineering Chemistry	Course Code: C110	
Max marks:30		

Q. No.	CO Mapping	No. of Students Attempted	Set Target Level (60%)	Attainment percentage
1	C110.1	26	23	88
2	C110.1	30	26	87
3	C110.1	52	49	94
4	C110.1	02	2	100
5	C110.1	51	41	80
6	C110.1	2	2	100
7	C110.1	2	1	50
8	C110.1	36	13	36
9	C110.2	28	19	68
10	C110.2	22	17	77

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Department of Engineering Chemistry



SECOND -IA- PERFORMANCE ANALYSIS

Course owner: Dr.Kottureshwara.N.M	Sem: I	Sec: F
Course Name: Engineering Chemistry	Course Code: C110	
Max marks:30		

Q. No.	CO Mapping	No. of Students Attempted	Set Target Level (60%)	Attainment percentage
1	C110.2	11	11	100
2	C110.2	45	41	91
3	C110.2	48	44	92
4	C110.2	09	08	89
5	C110.3	53	45	85
6	C110.3	02	01	50
7	C110.3	22	19	86
8	C110.3	35	33	94
9	C110.3	20	18	90
10	C110.3	35	29	83

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Department of Engineering Chemistry



THIRD -IA- PERFORMANCE ANALYSIS

Course owner: Dr.Kottureshwara.N.M	Sem: I	Sec: F
Course Name: Engineering Chemistry	Course Code: C110	
Max marks:30		

Q. No.	CO Mapping	No. of Students Attempted	Set Target Level (60%)	Attainment percentage
1	C110.4	54	42	78
2	C110.4	01	01	100
3	C110.4	43	32	74
4	C110.4	11	06	55
5	C110.4	50	48	96
6	C110.4	02	01	50
7	C110.4	49	42	86
8	C110.4	07	05	71
9	C110.4	02	02	100
10	C110.4	47	39	83

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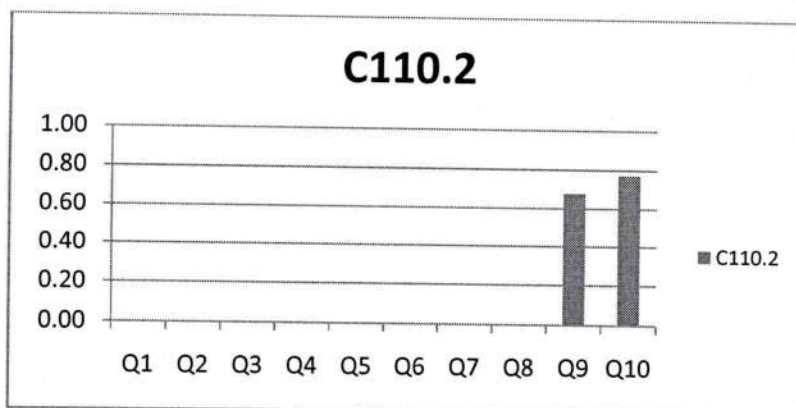
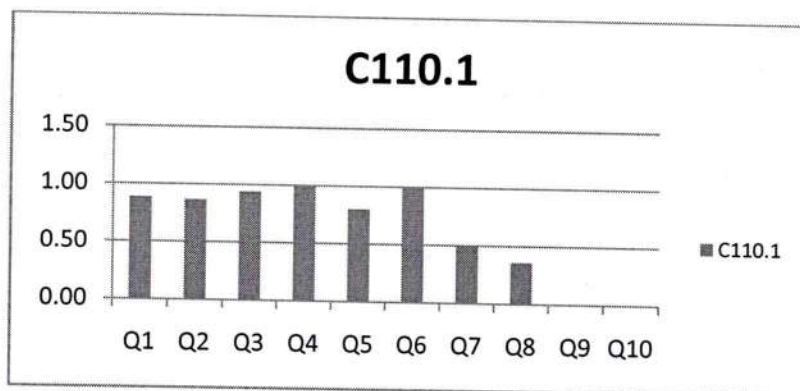


MICROANALYSIS OF IA-1

Internal Assessment I

Question/CO mapping	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10
Course Outcome	110.1	110.1	110.1	110.1	110.1	110.1	110.1	110.1	110.2	110.2
No. of students attended	26	30	52	02	51	02	02	36	28	22
Max Marks /Question	06	06	06	06	06	06	06	06	06	06
Total marks of class /question	130	157	285	9	253	12	07	104	122	96
Average marks scored by students/question	88	87	94	100	80	100	50	36	68	77
Total marks scored	957/1206 (201X6)								218/300	

Mark range	0-10	11to 20	21 to 30
No. Of Students	05	14	37



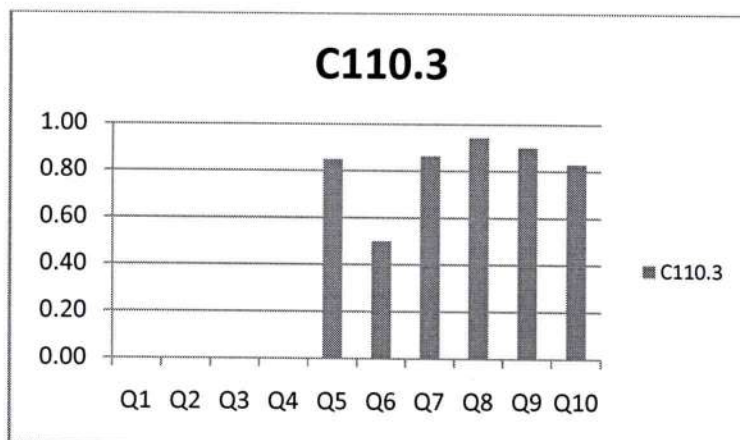
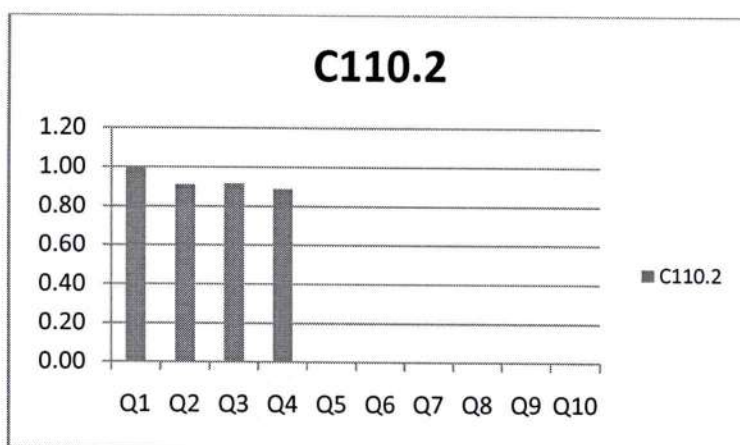


MICROANALYSIS OF IA- 2

Internal Assessment II

Question/CO mapping	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10
Course Outcome	110.2	110.2	110.2	110.2	110.3	110.3	110.3	110.3	110.3	110.3
No. of students attended	11	45	48	9	53	2	22	35	20	35
Max Marks /Question	06	06	06	06	06	06	06	06	06	06
Total marks of class /question	65	239	255	44	276	6	112	191	107	169
Average marks scored by students/question	100	91	92	89	85	50	86	94	90	83
Total marks scored	603/678 (113X6)				861/1002 (167X6)					

Mark range	0-10	11to 20	21 to 30
No. Students	0	10	47



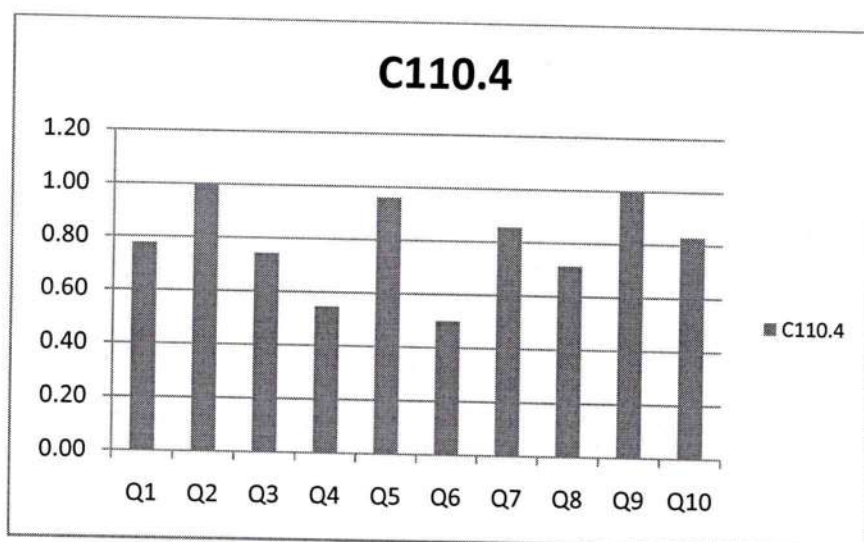


MICROANALYSIS OF IA- 3

Internal Assessment III

Question/CO mapping	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10
Course Outcome	110.4	110.4	110.4	110.4	110.4	110.4	110.4	110.4	110.4	110.4
No. of students attended	54	01	43	11	50	2	49	7	2	47
Max Marks /Question	06	06	06	06	06	06	06	06	06	06
Total marks of class /question	253	05	183	43	267	08	221	28	12	237
Average marks scored by students/question	78	100	74	55	96	50	86	71	100	83
Total marks scored	1257/ 1596 (266 students X 6 MARK)									

Mark range	0-10	11to 20	21 to 30
No. Students	01	19	36





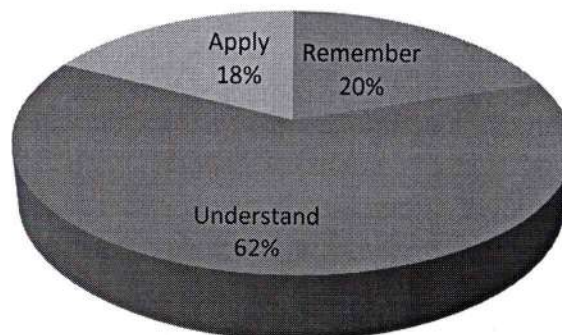
COURSE ASSESSMENT AND EVALUATION:

Questions for IA and FE will be designed to evaluate the various educational components (Bloom's taxonomy) such as:

IA and FE evaluation

Sl.No	Bloom's Category	BTL Level	IA1 % BTL	IA2 % BTL	IA3 % BTL	AVGE IA % BTL	FE % BTL
1	Remember	L1	6.66	16.6	36.6	19.9	31
2	Understand	L2	73.3	63.3	50	62.2	59
3	Apply	L3	20	20	13.3	17.7	10
4	Analyze	L4					
5	Evaluate	L5					
6	Create	L6					

Statistics of Blooms taxonomy followed in Internal Assessment Evaluation

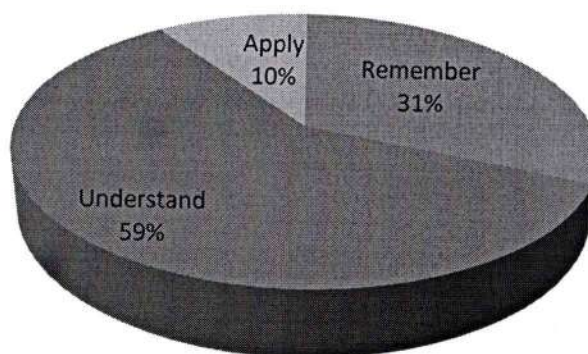




QUESTION PAPER ANALYSIS

Components			Total Marks of each component	Taxonomy categories						Total Weightage w.r.t Marks
				Remember	Understand	Apply	Analyze	Evaluate	Create	
I A	IA Tests (Avg of Best 3)	IA test1	30	04	44	12	0	0	0	60
		IA test2	30	10	38	12	0	0	0	60
		IA test3	30	22	30	08	0	0	0	60
F E	Exam (out of 100)	End Exam	100	62	118	20	0	0	0	200
Total Weightage w.r.t. Bloom's taxonomy				98	230	52	0	0	0	380

Statistics of Blooms taxonomy followed in Final Theory Evaluation





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Department of Engineering Chemistry



RUBRICS FOR THE ASSESSMENT OF WRITTEN ASSIGNMENT

Note: Please tick (✓) in the appropriate cells.

Criterion	5 Excellent	4 Very Good	3 Good	2 Average	1 Below Average
Completeness	Addresses all elements in the assignment and is of the prescribed length	Addresses most of elements in the assignment and is of the prescribed length	Addresses some elements in the assignment; may be less than the prescribed length	Incomplete in most respects; does not address elements of the assignment or meet the length requirement	Submission Not in time.
Understanding	Demonstrates a sophisticated understanding of the governance and leadership concepts in the assignment	Demonstrates an accomplished understanding of the governance and leadership concepts in the assignment	Demonstrates an acceptable understanding of the governance and leadership concepts in the assignment	Demonstrates an inadequate understanding of the governance and leadership concepts in the assignment	Not understanding the concepts at all.
Writing mechanics	Writing demonstrates a sophisticated clarity, conciseness, and correctness; includes thorough details and relevant data and information; extremely well-organized	Writing is accomplished in terms of clarity and conciseness and contains only a few errors; includes sufficient details and relevant data and information; well-organized	Writing lacks clarity or conciseness and contains numerous errors; gives insufficient detail and relevant data and information; lacks organization	Writing is unfocused, rambling, or contains serious errors; lacks detail and relevant data and information; poorly organized	Writing is Shabby difficult to read

COMMENTS: 70% excellent 15% very good, 10% good and 5% average

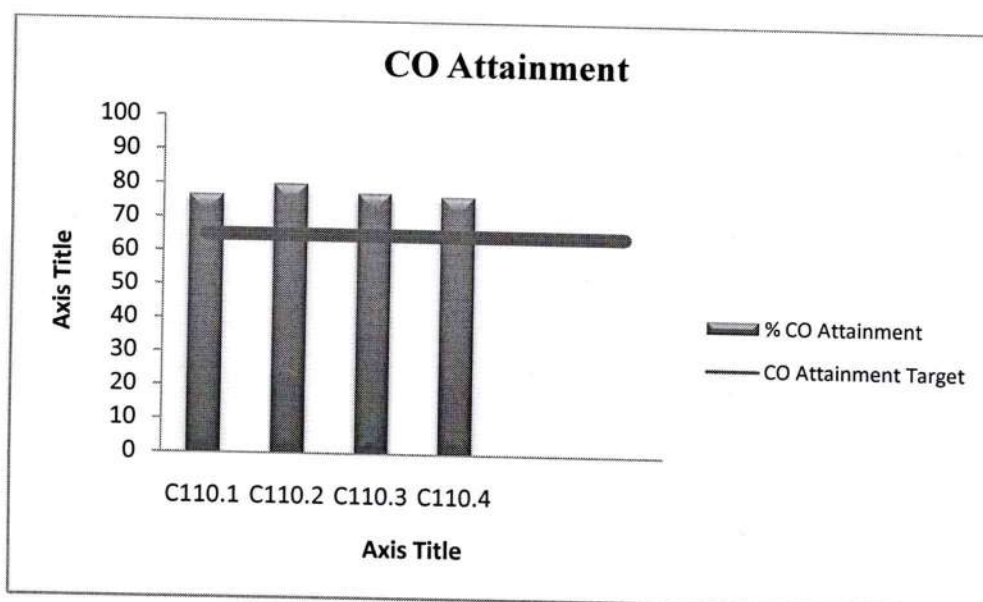
STAFF NAME: Dr. Kottuvishwara, MM


Signature of Faculty



CO DIRECT ATTAINMENT

Course Outcomes	IA Test (IA1+IA2+IA3)	FE	CO Direct Attainment $=0.70(\text{FE})+0.30(\text{IA})$	CO Direct Attainment
C110.1	0.25	0.52	0.77	77%
C110.2	0.28	0.52	0.80	80%
C110.3	0.26	0.52	0.77	77%
C110.4	0.25	0.52	0.77	77%





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Department of Engineering Chemistry



FIRST-SEM-2020-21

F-Sec

CO ATTAINMENT GAP ANALYSIS

Course Outcomes	CO Direct Attainment	CO Target	CO Attainment Gap
C110.1	77%	65%	Attained
C110.2	80%	65%	Attained
C110.3	77%	65%	Attained
C110.4	77%	65%	Attained

ACTION REPORT ON GAP ANALYSIS

Course Outcomes	Action proposed to bridge the gap	Modification of target if achieved
C110.1	No Gap	Higher target has to be set. However consistency of the attainment need to check in the coming semesters
C110.2	No Gap	Higher target has to be set. However consistency of the attainment need to check in the coming semesters
C110.3	No Gap	Higher target has to be set. However consistency of the attainment need to check in the coming semesters
C110.4	No Gap	Higher target has to be set. However consistency of the attainment need to check in the coming semesters

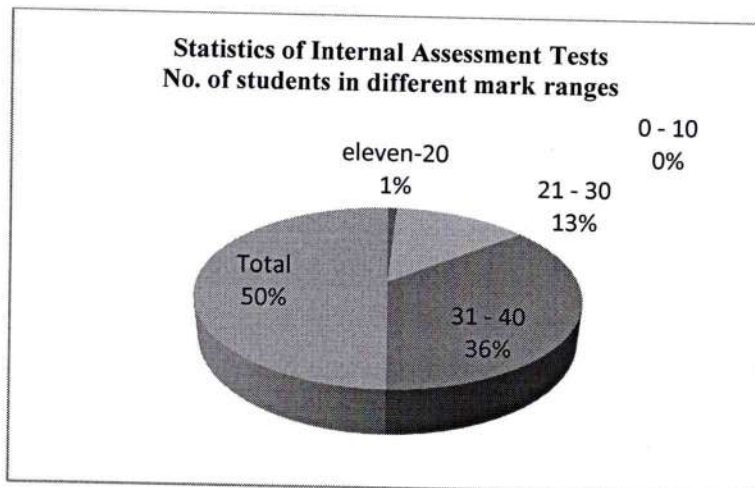


RESULT ANALYSIS

Result analysis has been done w.r.t IA and FINAL EXAM for the academic year 2020-2021.

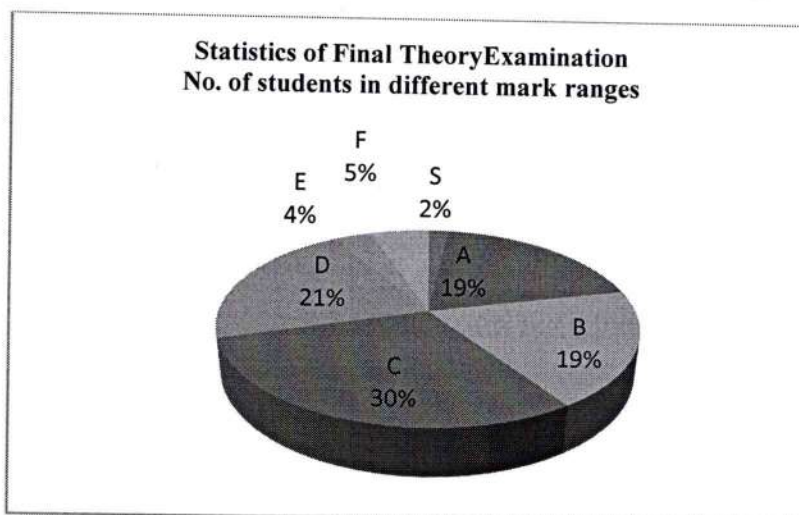
Statistics of Internal Assessment Tests

IA		No. of Students
Marks Range	0 - 10	0
	11 - 20	01
	21 - 30	15
	31 - 40	41
	Total	57



Statistics of Final Theory Examination

FE			No. of Students
Grade Range	10	S	01
	9	A	11
	8	B	11
	7	C	17
	6	D	12
	4	E	02
	0	F	03
	Total		57



Number of students appeared → 57

Number of students passed → 54

Number of students failed → 03

percentage of passing → 95%



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COURSE PLAN (LAB) 2020-2021

Sl No	List of Experiments	No. of hrs required	Assessment Strategy
01	Estimation of Total hardness of water by EDTA complexometric method.	02	IA & FE
02	Estimation of CaO in cement solution by rapid EDTA method.	02	IA & FE
03	Determination of percentage of Copper in brass using standard sodium thiosulphate	02	IA & FE
04	Determination of COD of waste water	02	IA & FE
05	Estimation of available chlorine in the bleaching powder	02	IA & FE
06	Determination Iron in the given haematite ore solution	02	IA & FE
07	Determination of sodium and potassium concentration in the given water sample by Flame photometry	02	IA & FE
08	Estimation of Copper colorimetrically.	02	IA & FE
09	Estimation of Acids in acid mixture conductometrically.	02	IA & FE
10	Determination of pKa of weak acid using pH meter.	02	IA & FE
11	Estimation of FAS potentiometrically using standard $K_2Cr_2O_7$ solution	02	IA & FE
12	Determination of Viscosity co-efficient of the given liquid using Ostwald's viscometer	02	IA & FE

Assessment Strategy

Assignment	I.A Test ✓	Final Exam ✓
Mention if any other required:		



Teaching and Learning Tools: Blackboard/PowerPoint presentation/webinar/lab

Resources:

Text Books:

1. G.H.Jeffery, J.Bassett, J.Mendham and R.C.Denney, "Vogel's Text Book of Quantitative Chemical Analysis"
2. O.P.Vermani & Narula, "Theory and Practice in Applied Chemistry", New Age International Publisers.

Contents beyond Syllabus:

1. Estimation of iron by colorimetry
2. Estimation the amount of oxalic acid using potassium permanganate

Signature of Course Coordinator



COURSE OUTCOMES (LAB) 2020-21

COURSE OUTCOME	DESCRIPTION
	Students will have knowledge in
C114.1	Handling different types of instruments for analysis of materials using small quantities of materials involved for quick and accurate results.
C114.2	Carrying out complexometric titrations for estimation of Total Hardness of water sample and Calcium Oxide in cement solution using comparatively more quantities of materials involved for good results
C114.3	Carrying out iodometric titrations for estimation of copper in brass and available chlorine in bleaching powder using comparatively more quantities of materials involved for good results
C114.4	Carrying out redox titrations for estimation of Chemical Oxygen Demand of water sample and Iron in haematite using comparatively more quantities of materials involved for good results

CO-PO-MAPPING (LAB)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C114.1	3	3										
C114.2	3	2										
C114.3	3	2										
C114.4	3	2										
AVG	3.0	2.25										

***Note:** - 1.Slight (Low)

2.Modarate (Medium)

3.Substantial (High).



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PO's addressed by CO's												
CO	1	2	3	4	5	6	7	8	9	10	11	12
C114.1	6hr	6hr										
C114.2	3hr	1hr										
C114.3	3hr	1hr										
C114.4	3hr	1hr										

Percent mapping of PO's												
CO	Programme Outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
C114.1	50%	50%										
C114.2	75%	25%										
C114.3	75%	25%										
C114.4	75%	25%										

Range of Percentage of mapping level	
Level 1	5%-24%
Level 2	25%-50%
Level 3	51% and above

Justification method adopted to measure the level of mapping	
Sl.No.	Justification
1	Contribution of C114.1 towards PO1 and PO2 are 06hours and 06hours respectively. Total number of hours or sessions taught PO1 and PO2 are 12 hours, hence the contribution for PO1 and PO2 are 50% and 50% respectively. Therefore, mapping level for PO1 is 3 and for PO2 is 3.
2	Contribution of C114.2 towards PO1 and PO2 are 3hours and 1hours respectively. Total number of hours or sessions taught PO1 and PO2 are 04 hours, hence the contribution for PO1 and PO2 are 75% and 25% respectively. Therefore, mapping level for PO1 is 3 and for PO2 is 2.
3	Contribution of C114.3 towards PO1 and PO2 are 3hours and 1hours respectively. Total number of hours or sessions taught PO1 and PO2 are 04 hours, hence the contribution for PO1 and PO2 are 75% and 25% respectively. Therefore, mapping level for PO1 is 3 and for PO2 is 2.
4	Contribution of C114.4 towards PO1 and PO2 are 3hours and 1hours respectively. Total number of hours or sessions taught PO1 and PO2 are 04 hours, hence the contribution for PO1 and PO2 are 75% and 25% respectively. Therefore, mapping level for PO1 is 3 and for PO2 is 2.



STRENGTH OF CO-PO-MAPPING LAB

CO	PO	BTL	No of hrs/session delivered
C114.1	PO1,PO2	L1,L2 & L3	12 of 24
C114.2	PO1,PO2	L1,L2 & L3	4 of 24
C114.3	PO1,PO2	L1,L2 & L3	4 of 24
C114.4	PO1,PO2	L1,L2 & L3	4 of 24

CO-PO INDICATOR MATRIX –LAB

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C114.1	IA and FE	IA and FE										
C114.2	IA and FE	IA and FE										
C114.3	IA and FE	IA and FE										
C114.4	IA and FE	IA and FE										

***Note:** - Indicators are Internal Assessment =**IA**, Final Exam=**FE**



RAO BAHADUR Y. MAHABALESWARAPPA ENGINEERING COLLEGE, BELLARY
Department of Engineering Chemistry



PERIODIC LESSON PLAN (LAB) 2020-2021

Course owner: Dr.Kottureshwara.N.M	Sem: I	Sec: F
Course Name: Engineering Chemistry LAB	Course Code: C114	Total Contact hours- 24
Faculty: Dr.Kottureshwara.N.M	Checked by: HOD	
Prerequisites: Basic Knowledge of Volumetric Analysis and Instrumental Analysis		

Experiment No	Experiment to be covered	Topic Learning outcome Students are	Hrs
1	Estimation of Total hardness of water by EDTA complexometric method.	Able to estimate the amount of Total hardness of water by EDTA complexometric method.	2
2	Estimation of CaO in cement solution by rapid EDTA method.	Able to estimate the amount of CaO in cement solution by rapid EDTA method.	2
3	Determination of percentage of Copper in brass using standard sodium thiosulphate	Able to estimate the amount of Copper in brass by iodometric method.	2
4	Determination of COD of waste water	able to estimate the amount of COD of waste water	2
5	Estimation of Iron in the given haematite ore solution	Able to estimate the amount of Iron in the given haematite ore solution	2
6	Estimation of available chlorine in the bleaching powder	Able to estimate the amount of available chlorine in the bleaching powder	2
7	Estimation of Copper by colorimetrically.	Able to estimate the amount of copper by colorimetrically	2
8	Estimation of Acids in acid mixture by conductometrically.	Able to estimate the amount of HCl and CH ₃ COOH by conductometrically	2
9	Determination of pKa of weak acid using pH meter.	Able to determine the dissociation constant by using pH meter	2
10	Estimation of FAS by potentiometrically using standard K ₂ Cr ₂ O ₇ solution	Able to estimate the amount of iron by potentiometrically	2
11	Determination of Viscosity co-efficient of the given liquid using Ostwald's viscometer	Able to determine the Viscosity co-efficient of the given liquid using Ostwald's viscometer	2
12	Determination of sodium and potassium concentration in the given water sample by Flame photometry	Able to estimate the sodium and potassium concentration in the given water sample by Flame photometry	2

Signature of faculty

Signature of HOD

Note: Lesson planning is a teacher's detailed description of the course of instruction or learning trajectory for lesson. A daily lesson plan is developed by teacher to guide class learning. Topic learning outcome shall be tabulated based on blooms taxonomy.



RAO BAHADUR Y. MAHABALESWARAPPA ENGINEERING COLLEGE, BELLARY
Department of Engineering Chemistry



LAB EVALUATION REPORT 2020-2021

Course owner: Dr.Kottureshwara.N.M	Sem: I	Sec: F
Course Name: Engineering Chemistry lab	Course Code: C114	Total Contact Hours- 24


	Batch No.F ₁	CONTINUOUS EVALUATION												
		Experiment conducted/Attendance /Record Marks (30)												
R.No.	USN	I	II	III	IV	V	VI	VII	VIII	IX	X	IA lab Test(10)	Total IA(40)	Student Signature
1	3VC20EC001	3	3	3	3	3	3	3	3	3	3	6	36	
2	3VC20EC002	0	3	3	3	3	3	3	3	3	3	7	34	
3	3VC20EC003	0	0	0	3	3	3	3	3	3	3	6	36	
4	3VC20EC004	3	3	3	3	3	3	3	3	3	3	7	34	
5	3VC20EC005	0	0	3	0	3	3	3	3	3	3	10	31	
6	3VC20EC006	3	3	3	3	3	3	3	3	3	3	5	35	
7	3VC20EC007	3	3	3	3	3	3	3	3	3	3	6	36	
8	3VC20EC008	3	3	3	3	3	3	3	3	3	3	6	36	
9														
10	3VC20EC009	3	3	3	3	3	3	3	3	3	3	9	39	
11	3VC20EC010	3	3	3	3	3	3	3	3	3	3	6	36	
12	3VC20EC011	3	3	3	3	3	3	3	3	3	3	8	38	
13	3VC20EC012	3	3	3	3	3	3	3	3	3	3	9	39	
14	3VC20EC013	3	3	3	3	3	0	3	3	3	3	9	36	
15	3VC20EC014	3	3	3	3	3	3	3	3	3	3	5	35	
16	3VC20EC015	3	3	3	3	3	3	3	3	3	3	5	35	
17	3VC20EC016	3	3	3	3	3	3	3	3	3	3	10	40	



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Department of Engineering Chemistry



18	3VC20EC017	3	3	3	3	3	3	3	3	3	3	5	35	
19	3VC20EC018	3	3	3	3	3	3	3	3	3	3	4	34	
20	3VC20EC019	3	3	3	3	3	3	3	3	3	3	8	38	
21	3VC20EC020	0	0	3	3	3	3	3	3	3	3	8	34	
22	3VC20EC021	3	3	3	3	3	3	3	3	3	3	10	40	
23	3VC20EC022	3	3	3	3	3	3	3	3	3	3	4	34	
24	3VC20EC023	3	3	3	3	3	3	3	3	3	3	6	36	
25	3VC20EC024	3	3	3	3	3	3	3	3	3	3	8	38	
26	3VC20EC025	3	3	3	3	3	3	3	0	3	3	7	34	
27	3VC20EC026	3	3	3	3	3	3	3	3	3	3	8	38	
28	3VC20EC027	3	3	3	3	3	3	3	3	3	3	8	38	
29	3VC20EC028	3	3	3	3	3	3	3	3	3	3	4	34	
30	3VC20EC029	3	3	3	3	3	3	0	3	3	3	6	33	


Signature of faculty



RAO BAHADUR Y. MAHABALESWARAPPA ENGINEERING COLLEGE, BELLARY
Department of Engineering Chemistry



R.N.	USN	CONTINUOUS EVALUATION												
		Experiment conducted/Attendance /Record Marks(30)										IA lab Test(10)	Total IA(40)	Student Signature
		I	II	III	IV	V	VI	VII	VIII	IX	X			
31	3VC20EC030	0	3	3	3	3	3	3	3	3	0	6	34	
32	3VC20EC031	0	0	3	3	3	3	3	3	3	3	7	31	
33	3VC20EC033	3	3	3	3	3	3	3	3	3	3	8	35	
34	3VC20EC034	3	3	3	3	3	3	3	3	3	3	5	40	
35	3VC20EC035	3	3	3	3	3	3	3	3	3	3	10	37	
36	3VC20EC036	3	3	3	3	3	3	3	3	3	3	1	31	
37	3VC20EC038	3	3	0	3	3	3	3	3	3	3	5	35	
38	3VC20EC039	3	3	3	3	3	3	3	3	3	3	8	35	
39	3VC20EC040	3	3	3	3	3	3	3	3	3	3	5	39	
40	3VC20EC041	3	3	3	3	3	3	3	3	3	3	9	39	
41	3VC20EC042	3	3	3	3	3	3	3	3	3	3	8	35	
42	3VC20EC043	0	3	3	3	3	3	3	3	3	3	7	34	
43	3VC20EC044	3	3	3	3	3	3	3	3	3	3	7	37	
44	3VC20EC045	0	3	3	3	3	3	3	3	3	3	4	31	
45	3VC20EC047	3	3	3	3	3	3	3	3	3	3	9	39	
46	3VC20EC048	3	3	3	3	3	3	3	3	3	3	8	38	
47	3VC20EC049	0	3	3	3	3	3	3	3	3	3	2	31	
48	3VC20EC050	0	3	3	3	3	3	3	3	3	3	7	34	
49	3VC20EC051	0	0	3	3	3	3	3	3	3	3	6	32	
50	3VC20EC052	3	0	3	3	3	3	3	3	3	3	7	34	



RAO BAHADUR Y. MAHABALESWARAPPA ENGINEERING COLLEGE, BELLARY
Department of Engineering Chemistry



	Batch No .F ₂	CONTINUOUS EVALUATION												
		Experiment conducted/Attendance /Record Marks(30)												
R.N.	USN	I	II	III	IV	V	VI	VII	VIII	IX	X	IA lab Test(10)	Total IA(40)	Student Signature
51	3VC20EC053	0	3	3	3	3	3	3	3	3	3	4	31	
52	3VC20EC054	0	0	3	3	3	3	3	3	3	3	7	31	
53	3VC20EC055	0	3	3	3	0	3	3	3	3	3	7	31	
54	3VC20EC056	0	3	3	3	0	3	3	3	3	3	7	31	
55	3VC20EC057	0	3	3	3	3	3	0	3	3	3	8	32	
56	3VC20EC058	3	3	3	3	0	0	3	3	3	3	8	32	
57	3VC20EC059	3	3	3	3	3	3	3	3	3	3	9	39	
58	3VC20EC060	3	3	3	3	3	3	3	3	3	3	9	39	

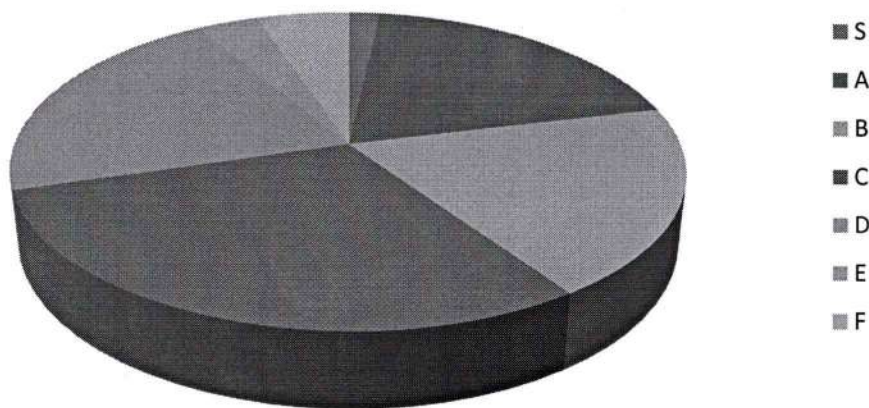
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Statistics of Final Practical Examination

FE			No. of Students
Grade Range	10	S	01
	9	A	11
	8	B	11
	7	C	17
	6	D	12
	4	E	02
	0	F	03
	Total		57

Statistics of Final Theory Examination
No. of students in different mark ranges



Number of students appeared → 57

percentage of passing → 100%

Number of students passed → 57

Number of students failed → 00


Signature of faculty



INSTRUCTOR REPORT

Delivery Methods (state the delivery methods used)

Black board was used and diagrams were drawn using different colored chalk for easy identification to the students.

Course Outcome Attainment Remarks:

Percentage of CO has attained and higher target has to be set. However, consistency of the attainment needs to check in the upcoming semesters

Instructor Feedback :

Result is satisfactory and I will try to improve in upcoming semester.
Contents beyond the syllabus also covered.

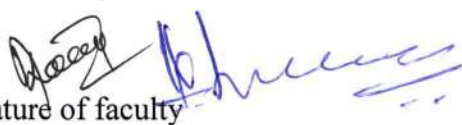
Best practices:

1. Conducting slip tests regularly (2-slip tests for each module)
2. Instructing the students to write multiple times, the answers of IA test questions depending upon the marks scored in the IA test.

S.NO.	Range of %	Times
1	60% to 80%	1
2	59% and below	2

The students who have scored above 80%, are instructed to write one time answers for not attempted or optional questions and who remain absent are asked to write the complete IA test and slip test questions as assignment.

3. Assignments
4. Solving previous semesters question papers
5. Conducting seminars at student level


Signature of faculty


HOD Signature

DIRECT ATTAINMENT 2020-21 ODD Sem

STAFF:	Dr.KOTTURESHWARA N.M	SUBJECT:	ENGINEERING CHE
SEM:	I F-SEC	SUB CODE:	18CHEL16

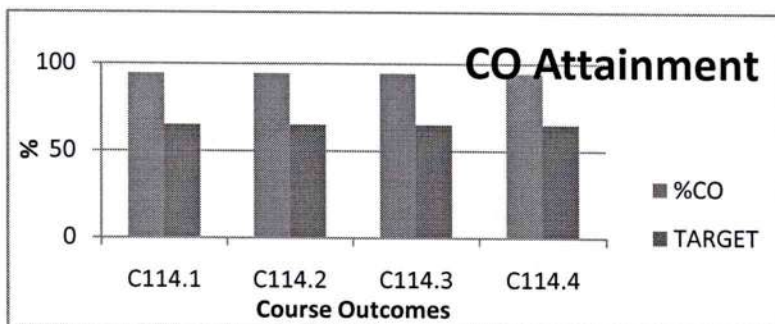
COURSE OUTCOME STATEMENT

C114.1	handling different types of instruments for analysis of materials using small quantities of materials involved for quick and accurate results
C114.2	carrying out Complexometric titrations for estimation of Total Hardness of water sample and Calcium Oxide in cement solution using comparatively more quantities of materials
C114.3	carrying out iodometric titrations for estimation of copper in brass and available chlorine in bleaching powder using comparatively more quantities of materials involved for good
C114.4	carrying out redox titrations for estimation of Chemical Oxygen Demand of water sample and Iron in haematite using comparatively more quantities of materials involved for good

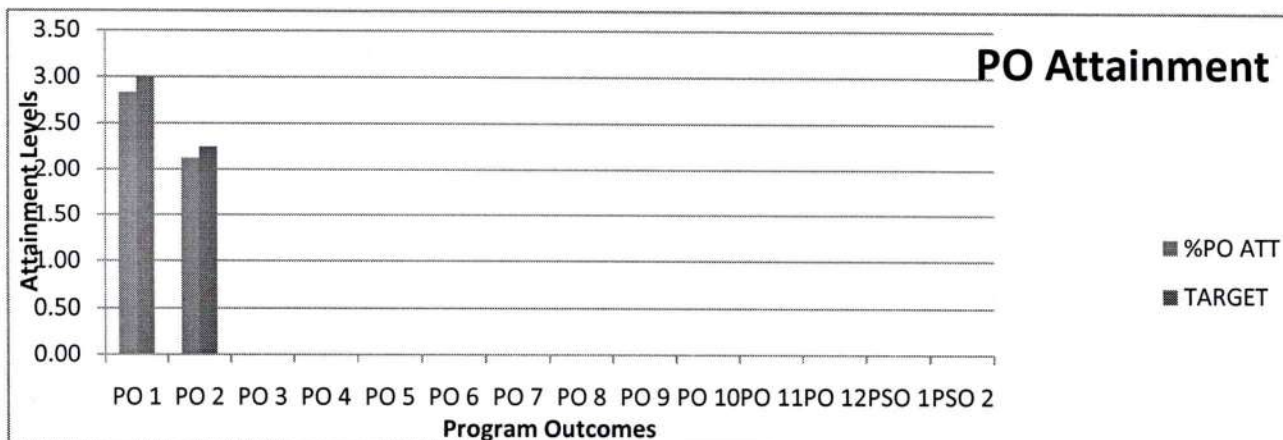
CO-PO-Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
C114.1	3	3												
C114.2	3	2												
C114.3	3	2												
C114.4	3	2												

	%CO	TARGET
C114.1	94.39	65
C114.2	94.39	65
C114.3	94.39	65
C114.4	94.39	65



	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
%PO ATT	2.83	2.12												
TARGET	3	2.25												



Indirect Attainment 2020-21 ODD Sem

STAFF	Dr.KOTTURESHWARA N.M	SUBJECT	ENGINEERING CHEMISTRY LAB
SEM	FIRST	SUB CODE	18CHEL16

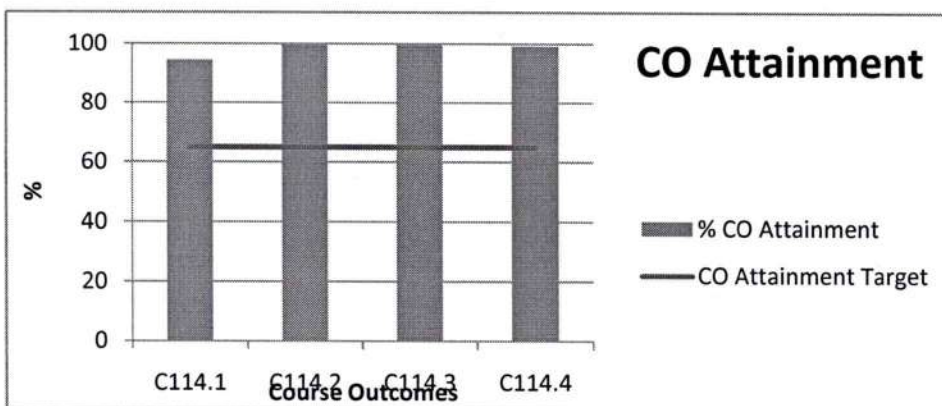
COURSE OUTCOME STATEMENT

C114.1	handling different types of instruments for analysis of materials using small quantities of materials involved for quick and accurate results
C114.2	carrying out Complexometric titrations for estimation of Total Hardness of water sample and Calci
C114.3	carrying out iodometric titrations for estimation of copper in brass and available chlorine in bleaching powder using comparatively more quantities of materials involved for good results
C114.4	carrying out redox titrations for estimation of Chemical Oxygen Demand of water sample and Iron in haematite using comparatively more quantities of materials involved for good results

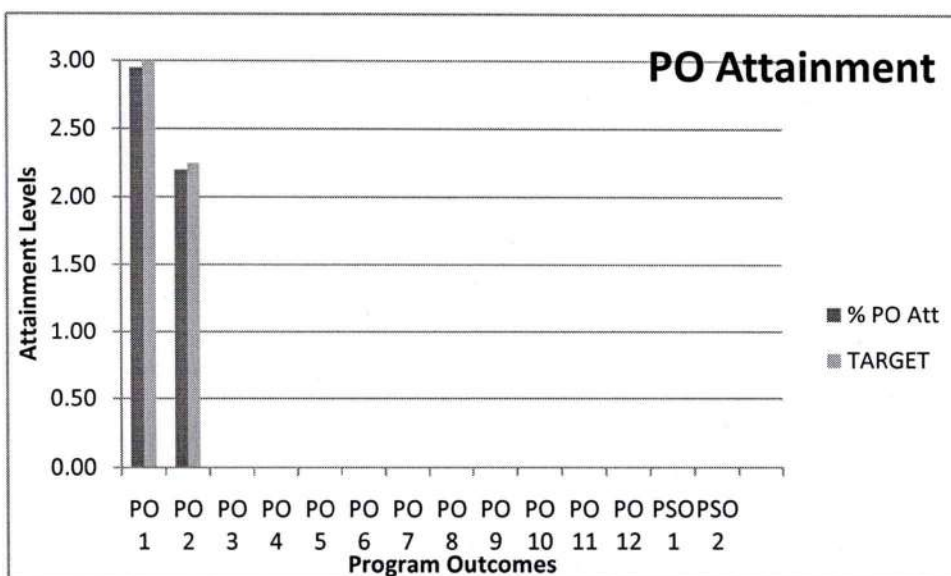
CO-PO-Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
C114.1	3	3										
C114.2	3	2										
C114.3	3	2										
C114.4	3	2										

	% CO Attainment	CO Attainment Target
C114.1	94.55	65
C114.2	99.64	65
C114.3	99.64	65
C114.4	99.27	65



PO's	% PO Att	TARGET
PO 1	2.95	3
PO 2	2.20	2.25
PO 3		
PO 4		
PO 5		0
PO 6		0
PO 7		0
PO 8		0
PO 9		0
PO 10		0
PO 11		0
PO 12		0
PSO 1		
PSO 2		



DIRECT ATTAINMENT 2020-21

Faculty: Dr.KOTTURESHWARA N.M

Code: 18CHE12

Subject: Engineering Chemistry

SEM: I

SEC: F

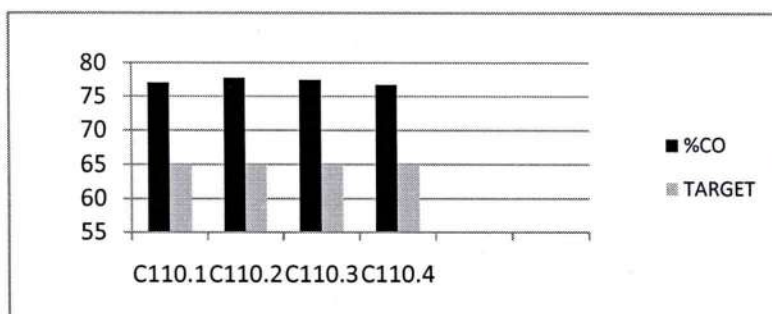
COURSE OUTCOME STATEMENT

C110.1	Students will have the knowledge in use of free energy in equilibria, rationalize bulk properties and processes using thermodynamic consideration electrochemical energy system and energy storage
C110.2	Students will have the knowledge in, causes and effects of corrosion of metals and control of
C110.3	Students will have the knowledge in Production and consumption for industrialization of country
C110.4	Students will have the knowledge in environmental pollution, waste management and water chemistry. Different techniques of instrumental methods of analysis. Fundamental principles of

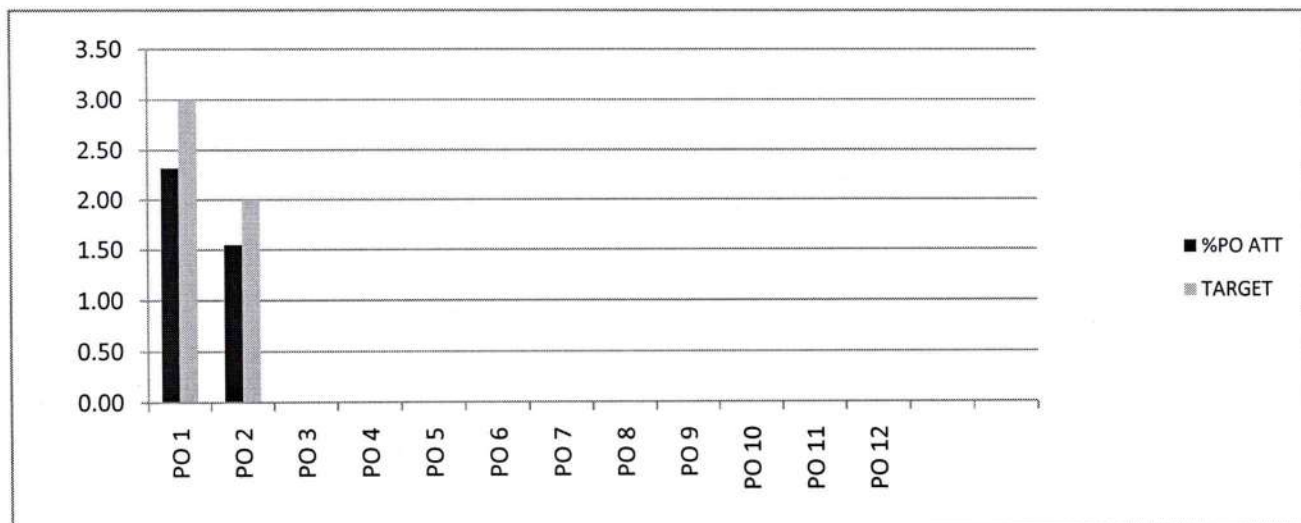
CO-PO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12		
C110.1	3	2	0	0	0	0	0	0	0	0	0	0		
C110.2	3	2	0	0	0	0	0	0	0	0	0	0		
C110.3	3	2	0	0	0	0	0	0	0	0	0	0		
C110.4	3	2	0	0	0	0	0	0	0	0	0	0		

	%CO	TARGET
C110.1	77.05	65
C110.2	77.79	65
C110.3	77.48	65
C110.4	76.73	65



	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12		
%PO ATT	2.32	1.55												
TARGET	3	2												



INDIRECT ATTAINMENT 2020-21

Faculty: Dr.KOTTURESHWARA N.M

Code: 18CHE12

Subject: Engineering Chemistry

SEM: I

SEC: F

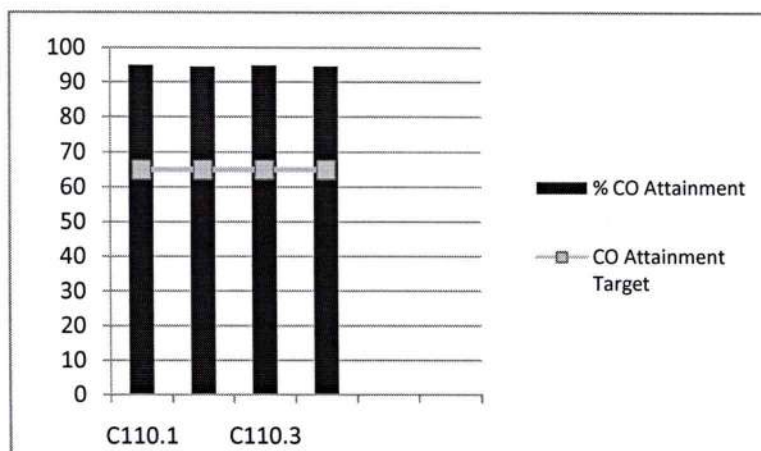
COURSE OUTCOME STATEMENT

C110.1	Students will have the knowledge in use of free energy in equilibria, rationalize bulk properties and processes using thermodynamic consideration electrochemical energy system and energy
C110.2	Students will have the knowledge in, causes and effects of corrosion of metals and control of
C110.3	Students will have the knowledge in Production and consumption for industrialization of
C110.4	Students will have the knowledge in environmental pollution, waste management and water

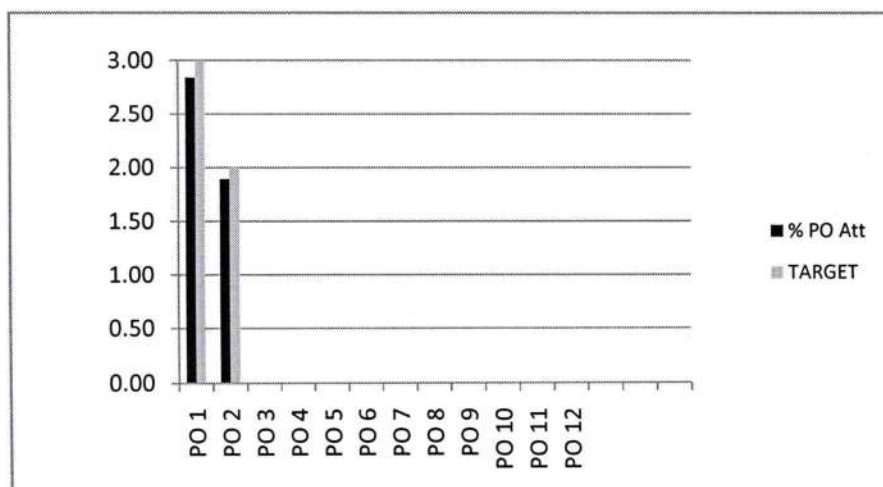
CO-PO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12		
C110.1	3	2	0	0	0	0	0	0	0	0	0	0		
C110.2	3	2	0	0	0	0	0	0	0	0	0	0		
C110.3	3	2	0	0	0	0	0	0	0	0	0	0		
C110.4	3	2	0	0	0	0	0	0	0	0	0	0		
	0	0	0	0	0	0	0	0	0	0	0	0		
	0	0	0	0	0	0	0	0	0	0	0	0		

	% CO Attainment	CO Attainment Target
C110.1	94.94	65
C110.2	94.48	65
C110.3	94.83	65
C110.4	94.6	65



PO's	% PO Att	TARGET
PO 1	2.84	3
PO 2	1.89	2
PO 3		
PO 4		
PO 5		
PO 6		
PO 7		
PO 8		
PO 9		
PO 10		
PO 11		
PO 12		





RAO BAHADUR Y. MAHABALESWARAPPA ENGINEERING COLLEGE, BELLARY
Department of Engineering Chemistry




COURSE ASSESSMENT AND EVALUATION SCHEME

THEORY AND LAB

	What		To Whom	When/ Where (Frequency in the course)	Max Marks	Evidence Collected	Contribution to Course Outcomes
Direct Assessment Methods	IA	Internal Assessment Tests	Students	Thrice(Average of the three will be computed)	40	Blue Books	1,2,3& 4
		Practical Assessment		once	40	Practical evaluation	1,2,3& 4
	FE	Final Examination		End of Course (Answering 5 of 10 questions)	60	Result sheet	1,2,3 & 4
		Practical Examination		Two question from lot	60	Result sheet	1,2,3 & 4
Indirect Assessment Methods	Students Feedback		Students	End of the course	-	Questionnaire	1,2,3 & 4 Effectiveness of Delivery of instructions & Assessment Methods
	Course Exit Survey						

Questions for IA and FE will be designed to evaluate the various educational components (Bloom's taxonomy)

Signature of faculty


HOD Signature
 Department of Chemistry,
 R. Y. M. Engineering College,
 Formerly Vijayanagar Engg. College,
 BELLARY-583 104