Department of Engineering Chemistry

COURSE INFORMATION

I & II SEMESTER B.E.
(ODD/EVEN SEMESTER)

For Academic Year 2020-2021

BMS Institute of Technology and Management, Yelahanka

Bengaluru – 560 064

BMS INSTITUTE OF TECHNOLOGY AND MANAGEMENT

Avalahalli, Doddaballapur Road, Yelahanka, Bangalore - 560064

Institution Calender of Events (CoE) 2020-21 (ODD Semester)

VISION OF THE INSTITUTE	To emerge as one of the finest technical institutions of higher learning, to develop engineering professionals who are technically competent, ethical and environment friendly for betterment of the society.
MISSION OF THE INSTITUTE	Accomplish stimulating learning environment through high quality academic instruction, innovation and industry-institute interface.

Month	Week	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Working Days	EVENTS
September	W-1			1	2	3	4	5	5	1-Sept.: Commencement of B.E (III, V, & VII Sem.), MCA (III & V Sem.) & M.Tech (III Sem.) Classes
	W-2	6	7	8	9	10	11	12	6	10-Sept.: FYP/PBL Group Formation
	W-3	13	14	15	16	17	18	19	5	17-Sept.: Mahalaya Amavasya
	W-4	20	21	22	23	24	25	26	6	21-Sept.: FYP/PBL Guide Allotment; 21-Sept.: FIMS Update
	W-5	27	28	29	30				3	30-Sept.: FYP/PBL Synopsis Submission
October	W-6					1	2	3	2	2-Oct.: Gandhi Jayanthi
	W-7	4	5	6	7	8	9	10	6	5-7 Oct.: Internal Assessment (IA) Test - 1 B.E (III, V, & VII Sem.) M.Tech (III Sem.), MCA (III & V Sem.)
	W-8	11	12	13	14	15	16	17	6	14-Oct.: SMS Dispatch for IA-1; 16-17 Oct.: Students Feedback -1 on Faculty; 17-Oct.: PTA for Higher Semester
	W-9	18	19	20	21	22	23	24	6	20-Oct.: FIMS Update
	W-10	25	26	27	28	29	30	31	3	26-Oct.: Vijayadashami; 27-28 Oct.: FYP/PBL Patentability Review - 1; 30-Oct.: Eid Milad; 31-Oct.: Valmiki Jayanthi
November	W-11	1	2	3	4	5	6	7	6	1-Nov.: Kannada Rajyotsava; 5-7 Nov.:Internal Assessment (IA) Test - 2 B.E (III, V, & VII Sem.) M.Tech (III Sem.), MCA (III & V Sem.)
	W-12	8	9	10	11	12	13	14	6	14-Nov.: Tech-Transform 2020 Notification; 14-Nov.: SMS Dispatch for IA-2
	W-13	15	16	17	18	19	20	21	5	16-Nov.: Balipadyami Deepavali; 16-17 Nov.: Students Feedback - 2 on Faculty; 20-Nov.: PBL Patentability Review - 2/BMSIT Open Day; 20-Nov.: FIMS Update; 21-Nov.: Tech-Transfrom 2020
	W-14	22	23	24	25	26	27	28	6	27-28 Nov.: FYP Patentability Review - 2
	W-15	29	30						1	
December	W-16			1	2	3	4	5	4	3-Dec.: Kanakadasa Jayanti
	W-17	6	7	8	9	10	11	12	6	7-9 Dec.: Internal Assessment (IA) Test -3 B.E (III, V, & VII Sem.) M.Tech (III Sem.), MCA (III & V Sem.)
	W-18	13	14	15	16	17	18	19	4	16-Dec.: SMS Dispatch for IA-3; 17-Dec.: Last Working Day for B.E (3rd, 5th, & 7th Sem.), MCA (3rd & 5th Sem.) & M.Tech (3rd Sem.) Classes
	W-19	20	21	22	23	24	25	26		21-Dec.: FIMS Update; 25-Dec.: Christmas
	W-20	27	28	29	30	31				
	Total Number of Working Days								86	

CONTINUOUS INTERNAL EVALUATION

COURSE	SEM	START	END
INTERNAL ASSESSMENT - 1			
B.E	I	TBA	TBA
B.E	III, V, VII	05-Oct	07-Oct
MCA	III & V	05-Oct	07-Oct
M.Tech	I	TBA	TBA
MCA	I	TBA	TBA
INTERNAL ASSESSMENT - 2			
B.E	I	TBA	TBA
B.E	III, V, VII	05-Nov	07-Nov
MCA	III & V	05-Nov	07-Nov
M.Tech	I	TBA	TBA
MCA	I	TBA	TBA
INTERNAL ASSESSMENT - 3			
B.E	I	TBA	TBA
B.E	III, V, VII	07-Dec	09-Dec
MCA	III & V	07-Dec	09-Dec
M.Tech	I	TBA	TBA
MCA	I	TBA	TBA

SEMESTER END EXAMINATIONS

COURSE	START OF EXAM	END OF EXAM
B.E : I - SEM		
B.E : III, V, & VII - SEM	04-01-2021	23-01-2021
M.Tech: I - SEM		
M.Tech: III - SEM	04-01-2021	23-01-2021
MCA: I - SEM		
MCA: III & V - SEM	04-01-2021	23-01-2021

PROFESSIONAL TRAINING/INTERNSHIP VIVA-VOCE

COURSE	SEM	START	END
B.E			
M.Tech	III	25-Jan	08-Feb
MCA			

COMMENCEMENT OF EVEN SEMESTER (2020-21)

COURSE	SEM	DATE
B.E	III, V & VII	08-Feb
MCA	III & V	08-Feb
M.Tech	III	22-Feb

LIST OF HOLIDAYS

17-Sep	Mahalaya Amavasya
02-Oct	Mahatma Gandhi Jayanthi
26-Oct	Vijayadashami
30-Oct	Eid-Milad
31-Oct	Maharishi Valmiki Jayanti
01-Nov	Kannada Rajyotsava
16-Nov	Balipadyami Deepavali
03-Dec	Kanakadasa Jayanti
25-Dec	Christmas

PARENTS-TEACHERS ASSOCIATION

PTA	DATE
PTA - 1	17-Oct
PTA - 2	TBA

PRACTICAL EXAMINATION

COURSE	SEM	DATES
B.E	III, V, & VII	21-Dec to 31-Dec
MCA	III & V	21-Dec to 31-Dec
M.Tech	III	21-Dec to 31-Dec

ABBREVIATIONS

IA	Internal Assessment	FIMS	Faculty Information Mgmt. System
IIC	Institution Innovation Council	FYP	Final Year Project
PTA	Parents-Teachers-Association	PBL	Projects Based Learning

Hatha 4/9/2020
Coordinator - COE

Head - IQAC

PRINCIPAL

BMS INSTITUTE OF TECHNOLOGY AND MANAGEMENT

DEPARTMENT OF CHEMISTRY

COURSE OUTCOMES: (Given by VTU)

COURSE: ENGINEERING CHEMISTRY
COURSE CODE: 18CHE12/22

Course Outcomes: On completion of this course, students will have knowledge in:
CO1: Use of free energy in equilibria, rationalize bulk properties and processes using thermodynamic considerations, electrochemical energy systems.

CO2: Causes & effects of corrosion of metals and control of corrosion. Modification of surface properties of metals to develop resistance to corrosion, wear, tear, impact etc., by electroplating and electroless plating.

CO3: Production & consumption of energy for industrialization of country and living standards of people. Electrochemical and concentration cells. Classical, modern batteries and fuel cells. Utilization of solar energy for different useful forms of energy.

CO4: Environmental pollution, waste management and water chemistry.

CO5: Different techniques of instrumental methods of analysis. Fundamental principles of Nanomaterials.

COURSE: ENGINEERING CHEMISTRY LAB
COURSE CODE: 18CHEL16/26
Course outcomes: On completion of this course, students will have the knowledge in:
CO1: Handling different types of instruments for analysis of materials using small quantities of materials involved for quick and accurate results.

CO2: Carrying out different types of titrations for estimation of concerned in materials using comparatively more quantities of materials involved for good results.

BMS INSTITUTE OF TECHNOLOGY AND MANAGEMENT

DEPARTMENT OF CHEMISTRY

COURSE OUTCOMES: (Department) (2018-19, 2019-20, 2020-2021)

COURSE: ENGINEERING CHEMISTRY
COURSE CODE: 18CHE12/22

Course Outcomes: On completion of this course, students will have knowledge in:

CO1: Understand the concept of free energy in equilibria and apply thermodynamic principles for the evaluation of electrochemical energy systems.

CO2: Evaluate the causes & effects of corrosion of metals and to prevent corrosion. Surface modification of metals to enhance the physical and mechanical properties by electroplating and electroless plating.

CO3: Identify sustainable energy sources and its utilization for the improved living standards of people and better industrialization of country.

CO4: Understand the impact of various types of pollution on environment and human beings and to control the factors affecting pollution by proper waste management.

CO5: Quantitative and qualitative analysis of materials by using different instruments. Understand the importance of nanomaterials and to study synthesis, properties and applications for industrial revolution

COURSE: ENGINEERING CHEMISTRY LAB
COURSE CODE: 18CHEL16/26

Course outcomes: On completion of this course, students will have the knowledge in:

CO1: Handling different types of instruments for analysis of materials using small quantities of materials involved for quick and accurate results.

CO2: Carrying out different types of titrations for estimation of concerned in materials using comparatively more quantities of materials involved for good results.

BMS INSTITUTE OF TECHNOLOGY AND MANAGEMENT

DEPARTMENT OF CHEMISTRY

CO-PO MAPPING (2018-19, 2019-20, 2020-2021)

Engineering Chemistry Theory -18CHE12/22

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1	-	1	-	-	-	-	-	-	-
CO2	3	2	1	-	1	-	--	-	-	-	-	-
CO3	3	2	1	-	1	-	1	-	-	-	-	-
CO4	3	2	-	-	-	-	1	2	-	-	-	-
CO5	3	2	1	2	1	-	-	-	-	-	-	-
CII	3	2	1	2	1	-	1	2	-	-	-	-

Engineering Chemistry Lab- 18CHEL16/26

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	-	2	1	-	-	-	-	-	-	-
CO2	3	1	-	2	1	-	-	-	-	-	-	-

HOD, CHEMISTRY

VISVESVARAYA TECHNOLOGICAL UNIVERSITY, BELAGAVI

B.E.SYLLABUS FOR 2018-2022

Engineering Chemistry

(Common to all branches)
[As per Choice Based Credit System (CBCS) scheme]
(Effective from the Academic Year 2018-19)

Course Code: 18CHE12/22	**CIE Marks: 40**
Contact Hours/Week: 05 (3L+2T)	**SEE Marks: 60**
Total Hours: 50 (8L+2T per module)	**Exam. Hours: 03**
Semester: I/II	**Credits: 04(3:2:0)**

Course Learning Objectives: This course (**18CHE12/22**) will enable students to

- Master the basic knowledge of engineering chemistry for building technical competence in industries, research and development.
- To develop knowledge in the fields of use of free energy in chemical equilibrium, electrochemistry and energy storage systems, Corrosion and metal finishing.
- To understand the importance of energy systems, environmental pollution,waste management, water chemistry, Instrumental methods of analysis and Nanomaterials.

MODULES

MODULE- I: Electrochemistry and Energy storage systems

Use of free energy in chemical equilibria: Thermodynamic functions: Definitions of free energy and entropy. Cell potential, derivation of Nernst equation for single electrode potential, numerical problems on E, E^0, and E_{cell}.

Electrochemical Systems: Reference electrodes: Introduction, construction, working and applications of Calomel electrode. Ion-selective electrode – Definition, construction and principle of Glass electrode, and determination of pH using glass electrode. Electrolyte concentration cells, numerical problems.

Energy storage systems: Introduction, classification - primary, secondary and reserve batteries. Construction, working and applications of Ni-MH and Li-ion batteries.

(RBT Levels: L3)

MODULE-II: Corrosion and Metal finishing

Corrosion: Introduction, Electrochemical theory of corrosion, 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. Types of corrosion - Differential metal and Differential aeration - pitting and water line). Corrosion control: Anodizing – Anodizing of aluminium, Cathodic protection - sacrificial anode and impressed current methods, Metal coatings - Galvanization.

Metal finishing: Introduction, Technological importance. Electroplating: Introduction, principles governing electroplating-Polarization, decomposition potential and overvoltage. Electroplating of chromium (hard and decorative). Electroless plating: Introduction, electroless plating of nickel & copper, distinction between electroplating and electroless plating processes.

(RBT Levels: L1 & L2)

MODULE-III : Energy Systems

Chemical Fuels: Introduction, classification, definitions of CV, LCV, and HCV, determination of calorific value of solid/liquid fuel using bomb calorimeter, numerical problems. Knocking of petrol engine – Definition, mechanism, ill effects and prevention. Power alcohol, unleaded petrol and

biodiesel.

Fuel Cells: Introduction, differences between conventional cell and fuel cell, limitations & advantages. Construction, working & applications of methanol-oxygen fuel cell with H_2SO_4 electrolyte, and solid oxide fuel cell (SOFCs).

Solar Energy: Photovoltaic cells- introduction, construction and working of a typical PV cell. Preparation of solar grade silicon by Union Carbide Process/Method. Advantages & disadvantages of PV cells.

(RBT Levels: L3)

MODULE IV: Environmental Pollution and Water Chemistry

Environmental Pollution: Air pollutants: Sources, effects and control of primary air pollutants: Carbon monoxide, Oxides of nitrogen and sulphur, hydrocarbons, Particulate matter, Carbon monoxide, Mercury and Lead. Secondary air pollutant: Ozone, Ozone depletion.

Waste Management: Solid waste, e-waste & biomedical waste: Sources, characteristics & disposal methods (Scientific land filling, composting, recycling and reuse).

Water Chemistry: Introduction**,** sources and impurities of water; boiler feed water, boiler troubles with disadvantages -scale and sludge formation, boiler corrosion (due to dissolved O_2, CO_2 and $MgCl_2$). Sources of water pollution, Sewage, Definitions of Biological oxygen demand (BOD) and Chemical Oxygen Demand (COD), determination of COD, numerical problems on COD. Chemical analysis of water: Sulphates (gravimetry) and Fluorides (colorimetry). Sewage treatment: Primary, secondary (activated sludge) and tertiary methods. Softening of water by ion exchange process. Desalination of sea water by reverse osmosis.

(RBT Levels: L3)

MODULE-V: Instrumental methods of analysis and Nanomaterials

Instrumental methods of analysis: Theory, Instrumentation and applications of Colorimetry, Flame Photometry, Atomic Absorption Spectroscopy, Potentiometry, Conductometry (Strong acid with a strong base, weak acid with a strong base, mixture of strong acid and a weak acid with a strong base).

Nanomaterials: Introduction, size dependent properties (Surface area, Electrical, Optical, Catalytic and Thermal properties). Synthesis of nanomaterials: Top down and bottom up approaches, Synthesis by Sol-gel, precipitation and chemical vapour deposition, Nanoscale materials: Fullerenes, Carbon nanotubes and graphenes – properties and applications.

(RBT Levels: L1 & L2)

Course Outcomes: On completion of this course, students will have knowledge in:

CO1: Use of free energy in equilibria, rationalize bulk properties and processes using thermodynamic considerations, electrochemical energy systems.

CO2: Causes & effects of corrosion of metals and control of corrosion. Modification of surface properties of metals to develop resistance to corrosion, wear, tear, impact etc. by electroplating and electroless plating.

CO3: Production & consumption of energy for industrialization of country and living standards of people. Electrochemical and concentration cells. Classical, modern batteries and fuel cells. Utilization of solar energy for different useful forms of energy.

CO4: Environmental pollution, waste management and water chemistry.

CO5: Different techniques of instrumental methods of analysis. Fundamental principles of nanomaterials.

Question paper pattern:

Note:- The SEE question paper will be set for 100 marks and the marks will be proportionately reduced to 60.

- The question paper will have **ten** full questions carrying equal marks.
- Each full question carries **20** marks.
- There will be **two** full questions (with a **maximum** of **three** sub questions) from each module.
- Each full question will have sub question covering all the topics under a module.
- The students will have to answer **five** full questions, selecting **one** full question from each module.

Text Books:

1. P.C. Jain & Monica Jain. **"Engineering Chemistry"**, Dhanpat Rai Publications, New Delhi (2015 Edition).
2. S. S. Dara, A textbook of Engineering Chemistry, 10th Edition, S Chand & Co., Ltd., New Delhi, 2014.
3. Physical Chemistry, by P. W. Atkins, Oxford Publications (Eighth edition-2006).

Reference books:

1. O.G. Palanna, **"Engineering Chemistry"**, Tata McGraw Hill Education Pvt. Ltd. New Delhi, Fourth Reprint (2015- Edition).
2. R.V. Gadag & A. Nityananda Shetty., **"Engineering Chemistry"**, I K International Publishing House Private Ltd. New Delhi (2015- Edition).
3. **"Wiley Engineering Chemistry"**, Wiley India Pvt. Ltd. New Delhi. Second Edition-2013.
4. B. Jaiprakash, R. Venugopal, Sivakumaraiah and Pushpa Iyengar, Chemistry for Engineering Students, Subhash Publications, Bengaluru, (2015- Edition).

VISVESVARAYA TECHNOLOGICAL UNIVERSITY, BELAGAVI

Engineering Chemistry Lab

(Common to all the branches)
[As per Choice Based Credit System (CBCS) scheme]
(Effective from the academic year 2018-19)

Course Code: 18CHEL16/26	**CIE Marks: 40**
No. of Hours/Week: 02	**SEE Marks: 60**
Total Hours: 42	**Exams. Hours: 03**
Semester: I/II	**Credits: 01(0:0:2)**

Course objectives:

Course objectives: To provide students with practical knowledge of

- Quantitative analysis of materials by classical methods of analysis.
- Instrumental methods for developing experimental skills in building technical competence.

Instrumental Experiments

1. Potentiometric estimation of FAS using standard $K_2Cr_2O_7$ solution.
2. Conductometric estimation of acid mixture.
3. Determination of Viscosity co-efficient of the given liquid using Ostwald's viscometer.
4. Colorimetric estimation of Copper.
5. Determination of pKa of the given weak acid using pH meter.
6. Flame photometric estimation of sodium and potassium.

Volumetric Experiments

1. Estimation of Total hardness of water by EDTA complexometric method.
2. Estimation of CaO in cement solution by rapid EDTA method.
3. Determination of percentage of Copper in brass using standard sodium thiosulphate solution.
4. Determination of COD of waste water.
5. Estimation of Iron in haematite ore solution using standard $K_2Cr_2O_7$ solution by external indicator method.
6. Estimation of percentage of available chlorine in the given sample of bleaching powder (Iodometric method)

Course outcomes: On completion of this course, students will have the knowledge in,
CO1: Handling different types of instruments for analysis of materials using small quantities of materials involved for quick and accurate results.
CO2: Carrying out different types of titrations for estimation of concerned in materials using comparatively more quantities of materials involved for good results.

Conduction of Practical Examination:

1. Examination shall be conducted for 100 marks, later reduced to 60 marks.
2. All experiments are to be included for practical examination.
3. One instrumental and another volumetric experiment shall be set.
4. Different experiments shall be set under instrumental and a common experiment under volumetric.

Reference 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 Publishers.
3. Gary D. Christian, "Analytical chemistry", 6th Edition, Wiley India.

BMS INSTITUTE OF TECHNOLOGY AND MANAGEMENT
DEPARTMENT OF CHEMISTRY

LESSON PLAN – 2020-2021

SUBJECT: ENGINEERING CHEMISTRY **HOURS PER WEEK: 04**
SUBJECT CODE: 18CHE12/22 **TOTAL HOURS: 50**
EXAM.MARKS: 100 reduced to 60 **IA MARKS: 40**

CLASS NO	MODULE	TOPICS TO BE COVERED	TEACHING HOURS	% OF THE SYLLABUS COVERED
1	I	**Electrochemistry and energy storage systems** Thermodynamic functions: Definitions of free energy and entropy	10 HOURS	20%
2		Cell potential, derivation of Nernst equation for single electrode potential		
3		Numerical problems on E, E^0, and E_{cell}		
4		Reference electrodes: Introduction, construction, working and applications of Calomel electrode		
5		Lab Session		
6		Ion-selective electrode Definition, construction and principle of Glass electrode, and determination of pH using glass electrode		
7		Electrolyte concentration cells, numerical problems		
8		Introduction, classification - primary, secondary and reserve batteries.		
9		Construction, working and applications of Ni-MH and Li-ion batteries.		
10		Lab Session		
11	V	**Corrosion and Metal Finishing:** Introduction, Electrochemical theory of corrosion	10 HOURS	40%
12		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		
13		Types of corrosion - Differential metal and Differential aeration - pitting and water line)		
14		Corrosion control: Anodizing Anodizing of aluminium, Cathodic protection - sacrificial anode and impressed current methods, Metal coatings - Galvanization		
15		Lab Session		
16		Introduction, Technological importance. Electroplating: Introduction		
17		Principles governing electroplating-Polarization, decomposition potential and overvoltage		
18		Electroplating of chromium (hard and decorative). Electroless plating: Introduction		
19		Electroless plating of nickel & copper, distinction between electroplating and electroless plating processes		
20		Lab Session		

21	II	**Energy Systems:** Introduction, classification, definitions of CV, LCV, and H CV	**10 HOURS**	**60%**
22		Determination of calorific value of solid/liquid fuel using bomb calorimeter		
23		Numerical problems. Knocking of petrol engine – .Definition, mechanism, ill effects and prevention		
24		Power alcohol, unleaded petrol and biodiesel		
25		Lab Session		
26		Introduction, differences between conventional cell and fuel cell, limitations & advantages		
27		Construction, working & applications of methanol-oxygen fuel cell with H_2SO_4 electrolyte, and solid oxide fuel cell		
28		Photovoltaic cells- introduction, construction and working of a typical PV cell		
29		Preparation of solar grade silicon by Union Carbide Process/Method. Advantages & disadvantages of PV cells.		
30		Lab Session		
31	IV	**Environmental Pollution and Water Chemistry:** Air pollutants: Sources, effects and control of primary air pollutants: Carbon monoxide, Oxides of nitrogen and sulphur, hydrocarbons	**10 HOURS**	**80%**
32		Particulate matter, Carbon monoxide, Mercury and Lead. Secondary air pollutant: Ozone, Ozone depletion		
33		Solid waste, e-waste & biomedical waste: Sources, characteristics & disposal methods (Scientific land filling, composting, recycling and reuse)		
34		Introduction, sources and impurities of water; boiler feed water, boiler troubles with disadvantages -scale and sludge formation		
35		Lab Session		
36		Boiler corrosion (due to dissolved O_2, CO_2 and $MgCl_2$). Sources of water pollution, Sewage		
37		Definitions of Biological oxygen demand (BOD) and Chemical Oxygen Demand (COD), determination of COD, numerical problems on COD		
38		Chemical analysis of water: Sulphates (gravimetry) and Fluorides (colorimetry)		
39		Sewage treatment: Primary, secondary (activated sludge) and tertiary methods. Softening of water by ion exchange process. Desalination of sea water by reverse osmosis		
40		Lab Session		
41	III	**Instrumental methods of analysis and Nanomaterials:** Theory, Instrumentation and applications of Colorimetry	**10 HOURS**	**100%**
42		Flame Photometry, Atomic Absorption Spectroscopy		
43		Potentiometry, Conductometry (Strong acid with a strong base		
44		Conductometry - weak acid with a strong base, mixture		

		of strong acid and a weak acid with a strong base		
45		Lab Session		
46		Introduction, size dependent properties (Surface area, Electrical, Optical, Catalytic and Thermal properties)		
47		Synthesis of Nanomaterials: Top down and bottom up approaches		
48		Synthesis by Sol- gel, precipitation and chemical vapour deposition		
49		Nanoscale materials: Fullerenes, Carbon nanotubes and graphenes properties and applications		
50		Lab Session		

Department of Chemistry

Engineering Chemistry

Course Material Links

1) https://bmsit.ac.in/dept/smaterial/chemistry
2) https://www.vtupulse.com/first-year-cbcs-notes/18che12-22-engineering-chemistry-notes/
3) https://www.youtube.com/channel/UCV05ohGnA1g6qnPOnuQff9Q

Course Materials available in the department

1) Notes of all Topics
2) Full-fledged labs – 2 nos.
3) Labs equipped with all instruments required for the regular experiments in the syllabus and for VTU exams.
4) Research Lab equipped for doing out of box experiments and for research activities
5) Models and few samples are available
6) Charts, Scientists photos, Periodic table etc are available and displayed in labs

BMS INSTITUTE OF TECHNOLOGY AND MANAGEMENT

DEPARTMENT OF CHEMISTRY

Assignment -2

NAME OF THE STUDENT: **SEMESTER:** II

SECTION/BRANCH: D & E/ ISE **ACADEMIC YEAR:** 2020-21

1. 0.6g of coal sample with 92% C, 5% hydrogen and 3% ash, caused a rise in temperature of 2000g water by 3.2^0C in a bomb calorimeter experiment. Calculate the gross and net calorific value of coal, water equivalent = 200g, specific heat of water= 4.187kJ/Kg/C, latent heat of steam= 587 calories/ g (1cal= 4.187J) **5 Marks**

2. On burning 0.75×10^{-3} kg of a solid fuel in a bomb calorimeter, the temperature of 2.5 kg water increased from 24^0C to 28^0C. The water equivalent of calorimeter and the latent heat of steam are 0.485 kg and 4.187 x 587 kJ/ kg respectively. Specific heat of water is 4.187 kJ/ kg/C, if the fuel contains 2.5% hydrogen; calculate its gross and net calorific values. **5 Marks**

3. On burning 0.83 g of a solid fuel in a bomb calorimeter, the temperature of 3500g of water increased from 25.5 ^{0}C to 29.2 ^{0}C. Water equivalent of calorimeter is 385 g and latent heat of steam is 587cal/g. Calculate the gross and net calorific values of fuel if percentage of hydrogen in fuel is 0.7%. **5 Marks**

4. Calculate GCV and NCV of a fuel from the following data: Mass of fuel=0.75g, Weight of water =1150g, water equivalent of calorimeter=350g, increase in temperature= 3.02^{o}C, % of hydrogen=2.8, latent heat of steam =587 cal/g, specific heat of water is 4.187KJ/kg.
5 Marks

BMS INSTITUTE OF TECHNOLOGY AND MANAGEMENT

DEPARTMENT OF CHEMISTRY

Assignment -2

USN : 1BY20IS065

NAME OF THE STUDENT: JITENDRIYADEEP **SEMESTER:** II

SECTION/BRANCH: D & E/ ISE **ACADEMIC YEAR:** 2020-21

1. 0.6g of coal sample with 92% C, 5% hydrogen and 3% ash, caused a rise in temperature of 2000g water by 3.2°C in a bomb calorimeter experiment. Calculate the gross and net calorific value of coal, water equivalent = 200g, specific heat of water= 4.187kJ/Kg/C, latent heat of steam= 587 calories/ g (1cal= 4.187J) **5 Marks**

Sol:- $GCV = \frac{(W_1+W_2)S\Delta t}{M}$ KJ Kg^{-1}

W_1 - Mass of water in calorimetry in Kg

W_2 - mass/water equivalent of the calorimeter in Kg

Δt - $t_2 - t_1$ = rise in temperature in °C

M - Mass of fuel in Kg

S - Specific heat of water in KJ Kg^{-1} C^{-1}

$W_1+W_2 = 2200g = 2.2$ Kg

$S = 4.187$ KJ Kg^{-1} C^{-1}

$\Delta t = 3.2$°C

$GCV = \frac{(2.2)(4.187)(3.2)}{0.6 \times 10^{-3}}$

GCV = 49127.46 KJ/kg

NCV = GCV - [0.09 x H% x latent heat of steam]

NCV = (49127.46 - (0.09 x 5% x 587 x 4.187))

NCV = 48021.46 KJ/kg

2. On burning 0.75 x 10^{-3} kg of a solid fuel in a bomb calorimeter, the temperature of 2.5 kg water increased from 24°C to 28°C. The water equivalent of calorimeter and the latent heat of steam are 0.485 kg and 4.187 x 587 kJ/ kg respectively. Specific heat of water is 4.187 kJ/ kg/C, if the fuel contains 2.5% hydrogen; calculate its gross and net calorific values. **5 Marks**

Sol:- $GCV = \frac{(W_1+W_2)S\Delta t}{M}$ KJ/kg

$= \frac{(2.5+0.485)(4.187)(4)}{0.75 \times 10^{-3}}$

= 66657.04

⇒ GCV = 66657.04 KJ/kg

NCV = GCV - (0.09 x H% x latent heat of steam)

= 66657.04 - (0.09 x 2.5 x 4.187 x 587)

NCV = 66104.04 KJ/kg

20/20

1BY20IS065

3. On burning 0.83 g of a solid fuel in a bomb calorimeter, the temperature of 3500g of water increased from 25.5 °C to 29.2 °C. Water equivalent of calorimeter is 385 g and latent heat of steam is 587cal/g. Calculate the gross and net calorific values of fuel if percentage of hydrogen in fuel is 0.7%.

5 Marks

Sol:- $GCV = \frac{(W_1+W_2)S\Delta t}{m}$ KJ/kg

$GCV = \frac{(3.5+0.385)(4.185)(3.7)}{0.83 \times 10^{-3}}$

$GCV = 72513.29$ KJ/kg

$NCV = GCV - (0.09 \times \%H \times \text{latent heat of steam})$

$= 72513.29 - (0.09 \times 0.7 \times 587 \times 4.187)$

$\Rightarrow NCV = 72358.45$ KJ/kg

4. Calculate GCV and NCV of a fuel from the following data: Mass of fuel=0.75g, Weight of water =1150g, water equivalent of calorimeter=350g, increase in temperature= 3.02°C, % of hydrogen=2.8, latent heat of steam =587 cal/g, specific heat of water is 4.187KJ/kg.

5 Marks

Sol:- $NCV = GCV - (0.09 \times \%H \times \text{latent heat of steam})$

$= 25289.48 - (0.09 \times 2.8 \times 587 \times 4.187)$

$NCV = 24670.12$ KJ/kg

$GCV = \frac{(W_1+W_2)S\Delta t}{m}$ KJ/kg

$= \frac{(1.15+0.35) \times 4.187 \times 3.02}{0.75 \times 10^{-3}}$

$GCV = 25289.48$ KJ/kg

CBCS SCHEME

USN | 1 | B | X | 2 | 0 | M | E | 0 | 3 | 7 |

18CHE12/22

First/Second Semester B.E. Degree Examination, Jan./Feb. 2021
Engineering Chemistry

Time: 3 hrs. Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. What is single electrode potential? Derive Nernst equation for single electrode potential. **(07 Marks)**

b. What are electrolyte concentration cells? Calculate the cell potential of the following call at 298 K.

$Ag \mid AgNO_3(0.005M) \parallel AgNO_3(0.5M) \mid Ag$ **(06 Marks)**

c. Explain the construction and working of Ni-MH battery. Mention its applications. **(07 Marks)**

OR

2 a. What are primary, secondary and reserve batteries? Explain with examples. **(06 Marks)**

b. Explain the construction and working of Li-ion battery. Mention its applications. **(07 Marks)**

c. What is glass electrode? Explain the determination of pH using glass electrode. **(07 Marks)**

Module-2

3 a. Define metallic corrosion. Explain the electrochemical theory of corrosion taking iron as an example. **(07 Marks)**

b. Explain : (i) Waterline corrosion and
(ii) Galvanic corrosion. **(06 Marks)**

c. What is electroplating? Explain the electroplating of chromium. **(07 Marks)**

OR

4 a. What is metal finishing? Mention any five technological importance of metal finishing. **(06 Marks)**

b. What is electroless plating? Explain the electroless plating of copper with relevant reactions. **(07 Marks)**

c. What is cathodic protection? Explain (i) Sacrificial anode (ii) Impressed current methods **(07 Marks)**

Module-3

5 a. Define gross calorific and net calorific of a fuel. Calculate GCV and NCV of a sample of a coal from the following data:
Mass of fuel taken = 0.75 g
Mass of water in the copper calorimeter = 2.5 kg
Water equivalent of calorimeter = 0.485 kg
Increase in temperature of water = 4°C
Specific heat of water = 4.187 kJ/kg/°C
Latent heat of steam = 587 × 4.187 KJ/kg
Percentage of hydrogen in fuel sample = 2.5 **(07 Marks)**

b. What are fuel cells? Describe the construction and working of Methanol-oxygen fuel cell. **(07 Marks)**

c. What are PV cells? Mention their advantages and limitations. **(06 Marks)**

OR

6 a. What is knocking? Explain its mechanism. (06 Marks)

b. What is chemical fuel? Explain the experimental determination of calorific value of solid / liquid fuel using Bomb calorimeter. (07 Marks)

c. Explain the preparation of Solar grade silicon by union carbide process. (07 Marks)

Module-4

7 a. What is desalination of water? Describe the process of reverse osmosis of sea water. (07 Marks)

b. In a COD test 30.2 cm^3 and 14.5 cm^3 of 0.05 N FAS solution are required for blank and sample titration respectively. The volume of the test sample used was 25 cm^3. Calculate the COD of the sample solution. (06 Marks)

c. Mention the sources of sulphur dioxide pollution. Write down its ill effects and control measure. (07 Marks)

OR

8 a. Explain the activated sludge treatment and sewage water. (06 Marks)

b. What are the sources, effects and control of lead pollution? (07 Marks)

c. What are the causes, effects and disposal methods of e-waste? (07 Marks)

Module-5

9 a. Explain the theory, instrumentation and application of conductometry. (07 Marks)

b. Explain the theory and instrumentation of potentiometry. (07 Marks)

c. Explain the synthesis of nanomaterial by sol-gel technique. (06 Marks)

OR

10 a. What are nanomaterials? Explain the synthesis of nanomaterials by precipitation method. (07 Marks)

b. What are fullerenes? Write any four applications of fullerenes. (06 Marks)

c. Explain the theory and instrumentation of colorimetry. (07 Marks)

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BMS INSTITUTE OF TECHNOLOGY AND MANAGEMENT

Avalahalli, Doddaballapur Main Road, Bengaluru - 560064

FIRST INTERNAL ASSESSMENT TEST, JANUARY, 2021

Course Name	Engineering Chemistry	Course Code	18CHE12
Branch & Semester	H, I, J, K, L, M, & N	Date	28-01-2021
Name of the Course Coordinator (s)	Dr. Bincy Rose Vergis	Max. Marks	50

Note: Answer THREE full questions from Part A and Part B questions are compulsory.

Q No.	PART A	Marks	Cos/K
1.	a.Define the following terms: i) Single electrode potential ii) Standard electrode potential, iii) Free energy, iv) Entropy & v) Ion selective electrode.	10	CO:1 K1
	OR		
2.	a. Derive Nernst equation for single electrode potential from thermodynamic principles. b. For Cd-Ag cell, $E^0_{Cd^{2+}}$ and $E^0_{Ag^+}$ are –0.4V and + 0.8 V respectively. Write the electrodes, cell representation, cell reactions and Calculate the EMF of the cell at 300 K . (Given $[CdSO_4]$ = 0.01 M and $[AgNO_3]$ = 0.2 M.)	5 + 5	CO:1 K1&2
3.	a. Explain electrolyte concentration cell? Give example. Derive Nernst equation for electrolyte concentration cell. b. The EMF of a cell, Fe/Fe^{2+} (0.01)//Fe^{2+} (C)/Fe is measured to be 2.78V at 300K. Calculate the concentration, C.	6+4	CO: 1 K1&2
	OR		
4.	a. Explain construction and working of glass electrode. b. How glass electrode can be used in the determination of pH of the given solution.	4+6	CO:1 K1 & 2
5.	a. Give the classification of battery with example. b. Explain construction and working of Ni-MH battery.	4+6	CO:1 K1
	OR		
6.	a.Explain construction and working of Lithium ion battery with a neat diagram. b. Explain why lithium is preferred as battery material and mention advantages of Lithium ion battery.	6+4	CO:1 K1
	PART B		
7.	With the knowledge of different aspects of electrode you have learned, write an innovative idea to construct the most efficient battery and explain how do you measure its efficiency.	10	CO:1 K4 & 5
8.	a.Which material do you prefer as the active battery material. Give reasons. b. Which is the anode material used in Lithium battery and why? c.Which material can be used as anode material in sodium battery?	5+3+2	CO:1 K3

Course outcomes.
Students will be able to:
CO1: Understand the concept of free energy in equilibria and apply thermodynamic principles for the evaluation of electrochemical energy systems.
CO2: Evaluate the causes & effects of corrosion of metals and to prevent corrosion. Surface modification of metals to enhance the physical and mechanical properties by electroplating and electroless plating.
Blooms Taxonomy:

Remembering (K1)	Understanding (K2)	Applying (K3)	Analyzing (K4)	Evaluating (K5)	Creating (K6)

Signatures of the Question Paper Scrutiny Committee

Course Coordinator(s)	Module Coordinator(s)	Program Coordinator	Head of the Department

BMS INSTITUTE OF TECHNOLOGY AND MANAGEMENT

Avalahalli, Doddaballapur Main Road, Bengaluru - 560064

FIRST INTERNAL ASSESSMENT TEST, JANUARY, 2021

Course Name	Engineering Chemistry	Course Code	18CHE12
Branch & Semester	H, I, J, K, L, M, & N	Date	28-01-2021
Name of the Course Coordinator (s)	Dr. Bincy Rose Vergis	Max. Marks	50

Note: Answer THREE full questions from Part A and Part B questions are compulsory.

Q No.	PART A	Marks	Cos/K
1.	i) Single electrode potential ii) Standard electrode potential, iii) Free energy, iv) Entropy & v) Ion selective electrode.	2*5 = 10	CO:1 K1
	OR		
2.	a. Derivation of Nernst Equation b. Formula Substitution with values E0 Cell calculation E cell calculation Units	5 1 1 1 1 1	CO:1 K1&2
3.	a. Definition of electrolyte concentration cell Diagram with example Representation Reactions Derivation of Nernst equation for electrolyte concentration cell. Conclusion b. Formula Substitution with values C calculation	1 1 1 2 1 1 1 1 1	CO: 1 K1&2
	OR		
4.	a. Diagram Representation Construction Working. b. Cell diagram Cell representation Boundary potential Asymmetry potential Explanation determination of pH of the given solution.	1 1 1 1 1 1 1 1 1 2	CO:1 K1 & 2
5.	a. 3 classifications of battery with example. b. Components	1+1+1+1 1	CO:1 K1

	construction working of Ni-MH battery. Reactions	2 2 1	
	OR		
6.	a. Components construction working of Ni-MH battery. Reactions. b. 2 reasons for why lithium is preferred as battery material 2 Advantages and mention advantages of Lithium ion battery.	1 1 2 2 2 2	CO:1 K1
	PART B	1	
7.	Suggestion of electrode material Why these materials are preferred Advantages of using these materials	4 4 2	CO:1 K4 & 5
8.	a. Which material do u prefer as the active battery material. Give reasons. c. Which is the anode material used in Lithium battery and why? d. Which material can be used as anode material in sodium battery?	2 3 3 2	CO:1 K3

Course outcomes.
Students will be able to:
CO1: Understand the concept of free energy in equilibria and apply thermodynamic principles for the evaluation of electrochemical energy systems.
CO2: Evaluate the causes & effects of corrosion of metals and to prevent corrosion. Surface modification of metals to enhance the physical and mechanical properties by electroplating and electroless plating.
Blooms Taxonomy:

Remembering (K1)	Understanding (K2)	Applying (K3)	Analyzing (K4)	Evaluating (K5)	Creating (K6)

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SECOND INTERNAL ASSESSMENT TEST, FEBRUARY, 2021

Course Name	Engineering Chemistry	Course Code	18CHE12
Branch & Semester	H, I, J, K, L, M, & N	Date	25-02-2021
Name of the Course Coordinator (s)	Dr. Jyoti Roy Choudhuri	Max. Marks	50

Note: Answer THREE full questions from Part A and Part B questions are compulsory.

Q No.	PART A	Marks	Cos/ K
1.	a) What is Electroplating? b) Explain the process of electroplating of Hard and Decorative Chromium.	3+7	CO:1 K1
	OR		
2.	a) What is corrosion? b) Explain the electrochemical theory of corrosion considering Iron (Fe) as an example.	2 + 8	CO:1 K1& 2
3.	a) 0.6g of Coal sample (carbon-90%, Hydrogen-3% and ash 7%) was subjected to combustion in a bomb calorimeter. Mass of water taken in the calorimeter was 2000g & the water equivalent of the calorimeter was 400g. The rise in temperature was found to be 3.0C. Calculate the gross and net calorific values of a sample (Specific heat of Water = 4.187kJ/kg/°C; Latent heat of steam= 2454 kJ/Kg). b) Write a short note on Pitting corrosion.	6+4	CO: 1 K1& 2
	OR		
4.	a) What is Gross calorific value? b) Explain the experimental determination of calorific value of solid fuel using bomb calorimeter.	2+8	CO:1 K1 & 2
5.	Write a brief note on the following terms: i) Unleaded Petrol ii) Bio-diesel, iii) Power alcohol.	3+4+3	CO:1 K1
	OR		
6.	a) What is fuel cell? b) Explain the construction, working and uses of methanol-oxygen fuel cell.	2+8	CO:1 K1
	PART B		
7.	A Honda motorbike is giving a low mileage for the usage of a particular petrol, suggest your innovative ideas regarding increasing the petrol efficiency to obtain higher mileage.	10	CO:1 K4 & 5
8.	a) What is a corrosion inhibitor? b) Explain the four different types of corrosion inhibitors.	2+8	CO:1 K3

Course outcomes
CO2: Evaluate the causes & effects of corrosion of metals and to prevent corrosion. Surface modification of metals to enhance the physical and mechanical properties by electroplating and electroless plating.
CO3: Identify sustainable energy sources and its utilization for the improved living standards of people and better industrialization of country.
Blooms Taxonomy
K1: Remember, K2:Understand, K3: Apply, K4: Analyze, K5: Evaluate, K6: Create

Signatures of the Question Paper Scrutiny Committee

J. Roy Choudhuri	K-Sunkha		Ramkrishnappa
Course Coordinator(s)	Module Coordinator(s)	Program Coordinator	Head of the Department

BMS INSTITUTE OF TECHNOLOGY AND MANAGEMENT

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SECOND INTERNAL ASSESSMENT TEST, FEBRUARY, 2021

Course Coordinator(s)	Module Coordinator(s)	Program Coordinator	Head of the Department

SCHEME OF VALUATION

Q. No.	Solution	Marks Distribution	Total Marks
	PART A		
1.a	Electroplating definition	2	02
1.b	Hard and Decorative Electroplating explanation	2+2	08
	Reactions	4	
	OR		
2.a	Corrosion definition	2	02
2.b	Electrochemical theory aspects and explaination	4	08
	Reactions	4	
3. a	Formula of GCV and NCV	2	06
	Calculation	2	
	Unit	2	
3.b	Pitting Corrosion definition and example	2	04
	Reactions and features	2	
	OR		
4.a	GCV Definition	2	02
4.b	Principle	2	08
	Components	2	
	Formula and Derivation	2	
	Diagram	2	
5.	Unleaded Petrol Definition, Compound used and application	3	10
	Bio-diesel Definition, Compound used, Reactions and application	4	
	Power Alcohol Definition, Compound used and application	3	
	OR		
6.a	Fuel Cell definition	2	02
6.b	Cathode, Anode and Electrolyte	3	08
	Cell reactions, diagram	3+2	
	PART B		
7.	Compression ratio concept	3	10
	Knocking and anti-knocking agents application	4	
	Power alcohol application	3	
	PART E		
8	Corrosion Inhibitor definition	2	10
	4 types of corrosion inhibitor definition	2+2+2+2	

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Avalahalli, Doddaballapura Main Road, Bengaluru - 560064

THIRD INTERNAL ASSESSMENT TEST, MARCH/APRIL 2021

Course Name	ENGINEERING CHEMISTRY	Course Code	18CHE12
Branch &Semester	H, I, J, K, L, M and N	Date	31-03-2021
Name of the Course Coordinator (s)	Dr Sudheer Kumar K H	Max. Marks	50

Note: *Answer **THREE** full questions from **Part A** and **Part B** questions are compulsory.*

Qn. No.		PART A	Marks	CO/K
1.	a.	Explain primary and secondary treatments (Activated sludge) of sewage water.	6 M	CO4 K:2
	b.	Write a note on boiler corrosion.	4 M	
		OR		
2.	a.	Explain the determination of fluoride concentration in water by SPADNS-colorimetric method.	10 M	CO4 K:2
3.	a.	What is photovoltaic cell?	2 M	CO3 K:2
	b.	Explain the manufacture of solar grade silicon by Union Carbide process.	8 M	
		OR		
4.	a.	What is COD? Explain the determination of COD of waste water.	7 M	CO4 K:2
	b.	$50cm^3$ of sewage water was refluxed with $20cm^3$ of 0.1N acidified $K_2Cr_2O_7$. The uncreated acidified $K_2Cr_2O_7$ consumed $10.2cm^3$ of 0.1N FAS. $25cm^3$ of 0.1N acidified $K_2Cr_2O_7$ when titrated under identical conditions consumed $31.1cm^3$ of 0.1N FAS. Calculate the COD of the sewage water.	3 M	
5.	a.	Explain theory, instrumentation and applications of Atomic absorption spectroscopy.	10 M	CO5 K:2
		OR		
6.	a.	Explain the principle of conductometric titration and explain its applications for all types of acid-base titrations (**strong acid v/s strong base, weak acid v/s strong base and mixture of acids v/s strong base**).	10 M	CO5 K:2
		PART B		
7.	a.	Turning waste into power is one of the most significant innovations in the waste management industry. Give your innovative ideas for waste management.	10 M	CO4 K:4
8.	a.	What is the pH of drinking water?	2 M	CO4 K:4
	b.	What are the implications of water pH on human health?	3 M	
	c.	How to do testing of water pH?	2 M	
	d.	How to treat pH in drinking water?	3 M	

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THIRD INTERNAL ASSESSMENT TEST, MARCH/APRIL 2021

Course outcomes (COs)

CO1: Understand the concept of free energy in equilibria and apply thermodynamic principles for the evaluation of electrochemical energy systems.
CO2: Evaluate the causes & effects of corrosion of metals and to prevent corrosion. Surface modification of metals to enhance physical and mechanical properties by electroplating and electroless plating.
CO3: Identify sustainable energy sources and its utilization for the improved living standards of people and better industrialization of country.
CO4: Understand the impact of various types of pollution on environment and human beings and to control the factors affecting pollution by proper waste management.
CO5: Quantitative and qualitative analysis of materials by using different instruments. Understand the importance of nano materials and to study synthesis, properties and applications for industrial revolution

Bloom's Category

Remembering (K1)	Understanding (K2)	Applying (K3)	Analyzing (K4)	Evaluating (K5)	Creating (K6)

Signatures of the Question Paper Scrutiny Committee

29/03/2021		—	
Course Coordinator(s)	**Module Coordinator(s)**	**Program Coordinator**	**Head of the Department**

SCHEME OF VALUATION

BMS INSTITUTE OF TECHNOLOGY AND MANAGEMENT

Avalahalli, Doddaballapura Main Road, Bengaluru – 560064

THIRD INTERNAL ASSESSMENT TEST, MARCH/APRIL 2021

Q. No.	Solution	Marks Distribution	Total Marks
PART A			
1.a	Primary Treatment	3	06
	Secondary Treatment	3	
1.b	Boiler Corrosion: CO2	1	04
	O2	1	
	MgCl2	2	
2.a	Principle	2	08
	Explanation- Bleaching Action	3	
	Procedure	3	
3.a	Definition of PV cell	2	02
3.b	Union Carbide Process- Reactions with explanation	8	08
4.a	Definition of COD	2	07
	Procedure to determine COD	4	
	Formula to calculate COD	1	
4.b	Formula	1	03
	Substitution	1	
	Final value with unit	1	
5.a	Principle of AAS	2	10
	Neat labelled diagram of instrument	2	
	Explanation of working of instrument	4	
	Applications	2	
6.a	Principle of conductometry	2	**10**
	Strong acid Vs Strong base	3	
	Weak acid Vs Strong base	3	
	Acid Mixture Vs Strong base	2	
PART B			
7	Innovative ideas on waste management	10	**10**
8	a	2	**10**
	b	3	
	c	2	
	d	3	

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Avalahalli, Doddaballapura Main Road, Bengaluru - 560064

FOURTH INTERNAL ASSESSMENT TEST, MARCH/APRIL 2021

Course Name	ENGINEERING CHEMISTRY	Course Code	18CHE12
Branch &Semester	H, I, J, K, L, M and N	Date	05-04-2021
Name of the Course Coordinator (s)	Dr Jyothi C Abbar	Max. Marks	50

Note: *Answer* ***THREE*** *full questions from* ***Part A;*** *and* ***Part B*** *questions are compulsory.*

Qn. No.		PART A	Marks	CO/K
1.	a.	Define Knocking? Explain the mechanism of knocking in petrol engine.	6 M	CO3
	b.	Define GCV & NCV.	4 M	K:2
		OR		
2.	a.	Define Reference electrode?	2 M	CO1
	b.	Explain construction, working & applications of Calomel electrode.	8 M	K:2
3.	a.	Calculate the EMF of the following Concentration cell at 298 K. $Ag_{(s)}/Ag^{+}(0.01M)//Ag^{+}(0.5M)/Ag_{(s)}$	4 M	CO1
	b.	A galvanic cell is constructed by coupling Ag and Cd electrodes dipped in 0.5 M $AgNO_3$ and 0.25 M $CdSO_4$ respectively at 25 °C. Write the cell reactions and calculate EMF of the cell. Given that std. reduction potentials of Ag and Cd are +0.80 V and -0.40 V respectively.	6 M	K:2
		OR		
4.	a.	What are the sources, effects and control of oxides of Sulphur pollution?	6 M	CO4
	b.	What are the sources, effects and control of Lead pollution?	4 M	K:2
5.	a.	Derive Nernst equation for Single electrode potential.	10 M	CO1 K:2
		OR		
6.	a.	Write a note on Unleaded Petrol.	4 M	CO3
	b.	A coal sample containing 92% C, 7%H_2, and 3% Ash is subjected to combustion in a bomb calorimeter. Calculate the Gross and Net Calorific values. Given the mass of coal sample is 0.85 x 10^{-3} kg. Mass of water in copper calorimeter is 2 kg, water equivalent of calorimeter is 0.75 kg, rise in temperature of water is 2.5 °C, latent heat of steam is 2454 KJ/Kg and specific heat of water is 4.187 KJ/Kg/°C	6 M	K:2
		PART B		
7.	a.	Air pollution is of largest risk to public health globally. Suggest your innovative ideas to combat air pollution.	10 M	CO4 K:4
8.	a.	What is nano catalyst? Name the nano catalyst used for the degradation of Waste Frying Oil to produce Biodiesel.	3 M	CO3 K:4
	b.	Mention the different techniques employed for the surface characterisation of the nano catalyst.	4 M	
	c.	According to the literature study, why incorporating graphene oxide with metal oxides seems efficient?	3 M	

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FOURTH INTERNAL ASSESSMENT TEST, MARCH/APRIL 2021

Course outcomes (COs)

CO1: Understand the concept of free energy in equilibria and apply thermodynamic principles for the evaluation of electrochemical energy systems.
CO2: Evaluate the causes & effects of corrosion of metals and to prevent corrosion. Surface modification of metals to enhance physical and mechanical properties by electroplating and electroless plating.
CO3: Identify sustainable energy sources and its utilization for the improved living standards of people and better industrialization of country.
CO4: Understand the impact of various types of pollution on environment and human beings and to control the factors affecting pollution by proper waste management.
CO5: Quantitative and qualitative analysis of materials by using different instruments. Understand the importance of nano materials and to study synthesis, properties and applications for industrial revolution

Bloom's Category

Remembering (K1)	Understanding (K2)	Applying (K3)	Analyzing (K4)	Evaluating (K5)	Creating (K6)

Signatures of the Question Paper Scrutiny Committee

Course Coordinator(s)	**Module Coordinator(s)**	**Program Coordinator**	**Head of the Department**

BMS INSTITUTE OF TECHNOLOGY AND MANAGEMENT

Avalahalli, Doddaballapura Main Road, Bengaluru – 560064

Department of Chemistry

SCHEME OF VALUATION

FOURTH INTERNAL ASSESSMENT TEST, MARCH/APRIL 2021

Q. No.	Solution	Marks Distribution	Total Marks
	PART A		
1.a	Definition:Knocking	2	06
	Mechanism with reaction	4	
1.b	Definition:GCV	2	04
	Definition:NCV	2	
2.a	Definition:Reference Electrode	2	02
2. b	Diagram	1	08
	Construction	2	
	Working	3	
	Application	2	
3.a	Formula	1	04
	Substitution	1	
	Final value with unit	2	
3.b	Cell reactions	2	06
	Formula with EMF Calculation	1	
	Formula	1	
	Substitution, Final value with unit	2	
4.a	Sources	2	06
	Effects	2	
	Control	2	
4.b	Sources	1	04
	Effects	1	
	Control	2	
5.a	Wmax eqn	1	10
	Vant Hoff eqn	1	
	Reduction reaction	1	
	Further derivation with neat steps	7	
6.a	Explanation	04	04
6.b	Formula of GCV NCV	02	06
	Substitution	02	
	Final Value with Unit	02	
	PART B		
7	Innovative ideas on Air pollution prevention	10	10
8	a Definition, Name of nanocatalyst	2+1	10
	b Name of 4 techniques	4	
	c Graphene oxide properties	3	

BMS
INSTITUTE OF TECHNOLOGY AND MANAGEMENT

DEPARTMENT OF ENGINEERING CHEMISTRY

LABORATORY MANUAL
(For First year B.E. students)

Name of the Student : .....

Semester : ..... Section: .....

University Seat No. : ..... Roll No.: .....

Batch : ..... Subject Code: 18CHEL16/26

BMS INSTITUTE OF TECHNOLOGY AND MANAGEMENT

Yelahanka, Bangalore - 64

Vision

To emerge as one of the finest technical institutions of higher learning to develop engineering professionals who are technically competent ethical and environment friendly for betterment of the society.

Mission

Accomplish stimulating learning environment through high quality academic instruction, innovation and industry - institute interface.

DEPARTMENT OF CHEMISTRY

Vision

To aspire, achieve and sustain, for excellence in academics.

Mission

To nurture the young minds and to bring awareness and flair for chemistry by personal attention and good guidance.

ENGINEERING CHEMISTRY LAB COURSE OUTCOMES

CO-1 Create awareness of pollution norms/industrial effluents

CO-2 Apply knowledge about chemical analysis for industrial materials

CO-3 Select the lubricant in various industries depending on the requirement

DEPARTMENT OF CHEMISTRY
B. E. I/II SEM

Expt. No	Date	Title of the Experiment	Marks		
		(A) INSTRUMENTAL EXPERIMENTS			
1.		Determination of viscosity coefficient of a given liquid using Ostwald's viscometer			
2.		Colorimetric estimation of Copper			
3.		Conductometric estimation of an Acid mixture using standard NaOH solution			
4.		Potentiometric estimation of FAS using standard $K_2Cr_2O_7$ solution			
5.		Determination of pKa value of a weak acid using pH meter			
6.		Flame photometric estimation of Sodium and potassium in the given sample of water.			
		(B) VOLUMETRIC EXPERIMENTS			
7.		Determination of Total Hardness of a sample of Water using Disodium salt of EDTA			
8.		Determination of CaO in the given sample of Cement by Rapid EDTA method			
9.		Determination of Percentage of Copper in Brass using standard Sodium thiosulphate solution			
10.		Determination of Iron in the given sample of Haematite ore solution using Potassium dichromate Crystals by external indicator method			
11.		Determination of COD of the given Industrial Waste water sample			
12.		Determination of Total Alkalinity of a given Water Sample using standard Hydrochloric acid			

"The difference between a successful person and others is not a lack of strength, not a lack of knowledge, but rather in a lack of will."

~Vincent T. Lombardi

Instrumental Experiments

Record of observation:

1. Laboratory temperature = ……...^{0}C

2. Density of water = d_w = ……. ……. g/cc

3. Viscosity co-efficient of water = η_w = …….……..mpoise

4. Density of given liquid = d_l =……g/cc

Tabulation: Flow Time Measurement

Liquid	Time of Flow in "seconds"
Given liquid (t_l)	1.
	2.
	3.
	Mean time t_l =……s
Water (t_w)	1.
	2.
	3.
	Mean time t_w =…….s

Title of the Experiment:

Determination of Viscosity co-efficient of a given liquid using Ostwald's Viscometer

Experiment No. : 1 **Date :**

Principle:

Viscosity of a liquid may be defined as the resistance that one part of a fluid offers to the flow of another part of the liquid. Viscosity is produced by the shearing effect of moving one layer of the fluid past another. It may be thought as caused by the internal friction of the molecule themselves. When a liquid is in laminar flow through a tube the layer close to the surface of the tube is almost stationary and the layer at the axis of the tube moves faster than any other layer. A slow moving layer exerts a friction on its nearest layer. The coefficient of viscosity **(η)** is defined as the force per unit area required to move a layer of fluid with a unit velocity difference past another parallel layer at unit distance away. In cgs system of units, the coefficient of a fluid is expressed in poises.

The viscosity coefficient of a liquid is given by **Poiseuille's equation**.

$$\eta = \frac{\pi P r^4 t}{8vl} = \frac{\pi\, hdg\, r^4 t}{8vl}$$

where **v** is the volume of the liquid of viscosity coeffiecient **(η)** which flows in time **t** through a capillary tube of radius **r** and length **l** under a pressure head of **P**.

We know that, **ρ = hdg,** where, **h** = height , **d** = density, **g** = acceleration due to gravity.

If equal volumes of two liquids are allowed to flow through the same capillary under identical conditions,

$$\frac{\eta_l}{\eta_w} = \frac{\pi\, hd_l g\, r^4 t_l}{8vl} \times \frac{8vl}{\pi\, hd_w g\, r^4 t_w} = \frac{d_l t_l}{d_w t_w}$$

The flow times for the liquid and water are determined in Ostwalds viscometer. Knowing the densities of the liquid and water and also knowing the viscosity coefficient of water, viscosity coefficient of liquid can be calculated. Since viscosity is dependent on temperature the measurement can be carried out in water bath to reduce the change in temperature.

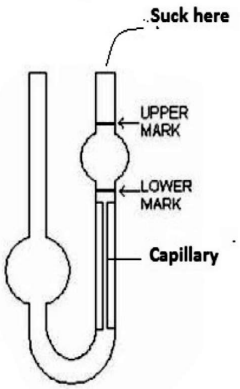
Calculation:

Viscosity coefficient of the given liquid, $\eta_l = \frac{d_l \times t_l}{d_w \times t_w} \times \eta_w$

=

=

= …… m poise at ……^{o}C



Ostwald's Viscometer

Procedure:

Take a clean and viscometer and fix the viscometer vertically to a stand. Using a burette transfer a known volume (say 10 ml of the lower bulb) of water through wider limb. Suck the water above the upper mark of the viscometer. Allow it to flow freely through the capillary, when the level of the water just crosses upper mark, start the stop clock and when the water just crosses the lower mark, stop the stop clock. Note down the time of flow in seconds (t_w). Repeat the same procedure twice.

Pour out the water, rinse the viscometer with acetone and dry it. Repeat the experiment by taking exactly the same volume (as that of water) of the given liquid whose viscosity is to be determined and record the time of the flow in seconds (t_l). Repeat the procedure to get agreeing values.

Result: Viscosity coefficient of the given liquid is……...……..m poise at …...…….^{o}C

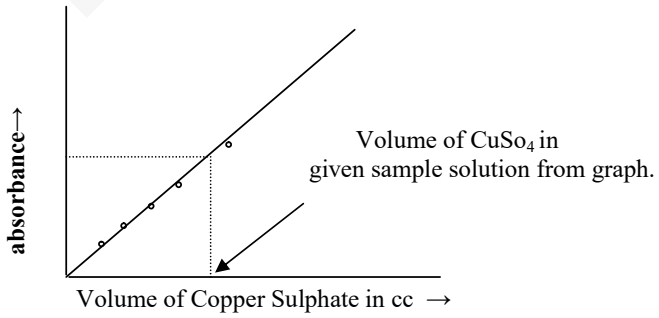
Staff Signature

Tabulation:

Filter with wavelength _____ is selected as it shows maximum Optical Density for Cu^{2+} ions.

Flask Number	Volume of $CuSO_4$ in cc 'V'	Optical density	Weight of $CuSO_4$ (5 × V) mg	Weight of Copper (1.2724 × V) mg
Blank	0			
1	5			
2	10			
3	15			
4	20			
5 (Test solution)	(Ux)			

Nature of Graph:



PRACTICAL EXAMINATION

SCHEME OF VALUATION

Subject : Engg. Chemistry **Lab. Subject code : 18CHEL16/26**

Description	Max. Marks	Part A marks	Part B Marks
Procedure write up	15	08	07
Conduction	52	26	26
Calculation, Graph works and result	18	09	09
Viva-Voce	15	07	08

PART – A : INSTRUMENTAL					
Potentiometry, Colorimetry & Flame Photometry(Na/K)		pK_a and Viscosity		Conductometry	
Error (cm^3)	Marks	Error (%)	Marks	Error (cm^3)	Marks
± 0.5	26	± 5.0	26	± 0.5	13 + 13
± 0.51 to 0.6	24	± 5.1 to 6.0	24	± 0.51 to 0.6	11+11
± 0.61 to 0.7	22	± 6.1 to 7.0	22	± 0.61 to 0.7	10+10
± 0.71 to 0.8	20	± 7.1 to 8.0	20	± 0.71 to 0.8	8+8
± 0.81 to 1.0	18	± 8.1 to 10.0	18	± 0.81 to 1.0	6+6
> ± 1.0	Zero	> ± 10.0	Zero	> ± 1.0	Zero
Graph : 5 marks Calculation : 4 marks		pK_a : Two Graphs : 5 + 4 Marks Viscosity : Calculation : 9 marks		Graph : 5 marks Calculation : 4 marks	

PART – B : VOLUMETRY	
Total Hardness, CaO in Cement, Cu in Brass, Fe in Haematite, COD, Total alkalinity,	
Error (cm^3)	Marks
± 0.2	13 + 13
± 0.3	11 + 11
± 0.4	9 + 9
± 0.5	7 + 7
± 0.6	5 + 5
> ± 0.6	Zero
Calculation : 9 Marks Note : Best Two(out of Three) TITRE values should be considered for valuation	

BMS

INSTITUTE OF TECHNOLOGY AND MANAGEMENT

Yelahanka, Bengaluru - 560 064.

RECORD OF PRACTICAL WORK

NAME	SREEYUK	UNIVERSITY SEAT NUMBER (USN)	1BY2[illegible]197
PROGRAMME	CSE	SEMESTER/ SECTION	II / C
COURSE CODE	19CHEL2C	COURSE NAME	CHEM Lab

B.M.S. INSTITUTE OF TECHNOLOGY AND MANAGEMENT

Yelahanka, Bengaluru - 560 064

RECORD OF PRACTICAL WORK

NAME	Sreedhk.G	UNIVERSITY SEAT NUMBER (USN)	1BY20CS187
PROGRAMME	BE-CSE	SEMESTER/ SECTION	II/C
COURSE CODE	18CHE16/26	COURSE NAME	CHem Lab

B.M.S. INSTITUTE OF TECHNOLOGY AND MANAGEMENT

Yelahanka, Bengaluru - 560 064

LABORATORY CERTIFICATE

This is to Certify that Mr. / Ms. Sreedhar Gattupalli

has Satisfactorily completed the course of experiments in Practical

Engineering Chemistry lab Prescribed

by the Visvesvaraya Technological University for II

Semester B.E Course in the Laboratory of the college

in the year 2020 - 2021

Head of the Department

Staff incharge of the Batch

Date : .....

Marks	
Maximum	Obtained
40	40

Name of the Candidate : Sreedhar G

Roll No : 187 USN : 1BY20CS187

Sreedhar G

Signature of the Candidate

Particulars of the Experiments Performed

CONTENTS

Particulars of the Experiments Performed

CONTENTS

Expt No.	Date	Experiment	Marks Obtained	Page No.
		Solution.		
9	9/7/21	Determination of Iron in the given sample of haematite solution	30/30	22
10	9/7/21	Determination of COD of the given industrial waste water sample.	30/30	25

1BY20CS187
Sreeanth. G

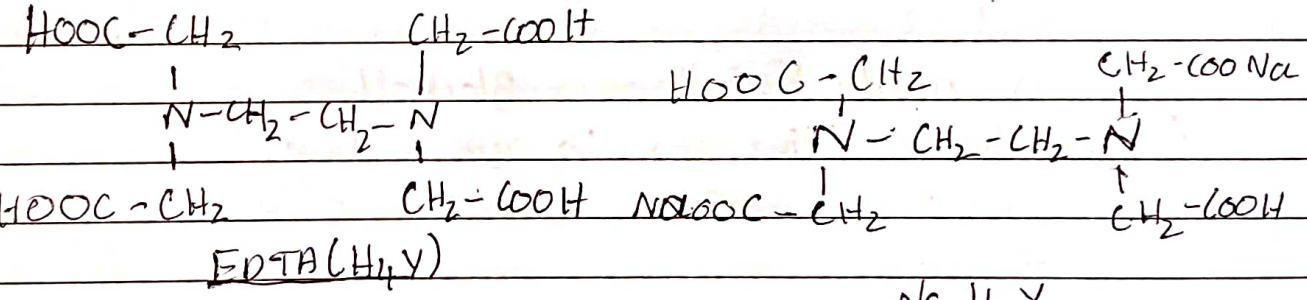
Date _____

Expt. No. 1 Page No. 1

Determination of Total hardness of a sample of water using Disodium salt of EDTA

Principle :

Hardness of water is due to the presence of calcium and magnesium salts in water. Ethylenediamine tetraacetic acid (EDTA) forms complexes with a large number of cations including Ca^{+2} and Mg^{+2} ions. Therefore the hardness of water may be determined by titrating a known volume of water sample with standard solution of EDTA, using Eriochrome Black-T as an indicator. Accordingly, it is possible to determine the total hardness of water using EDTA reagent.



EDTA (H_4Y)

Na_2H_2Y

The EDTA molecule (H_4Y) has two easily replaceable hydrogen atoms and the resulting ion after ionization may be represented as H_2Y^{2-}. The latter forms complexes with metal ions as follows.

$$M^{2+} + H_2Y^{2-} \longrightarrow MY^{2-} + 2H^+ \quad \text{--- (1)}$$

Teacher's Signature : _____

B M S Institute Of Technology & Management

BATCH: 2020 **SEM:** II **SESSION:** Dec-20
SUBJECT: Engineering Chemistry **BRANCH:: INFORMATION SCIENCE**

TARGET	LEVEL
60% of students must score 60% marks & above	3
55% of students must score 60% marks & above	2
50% of students must score 60% marks & above	1

PO AND CO SCALE		
3	strongly related	
2	moderately related	
1	less related	

BATCH	2020
SEM	II
SUB	Engineering Chemistry
SESSION	MAY 2021-SEP 2021
Class Strength	64
Set Target	60%
Target >=60%	
3	60%
2	55%
1	50%
No. of COs	5

COURSE OUTCOMES	ATTAINMENT LVL- I A	ATTAINMENT LVL- UNIVERSITY	OVERALL ATTAINMENT LVL
CO1	3.00	3.00	3
CO2	3.00	3.00	3
CO3	3.00	3.00	3
CO4	3.00	3.00	3
CO5	3.00	3.00	3
CLASS STRENGTH		64	3
SET TARGET		60%	

	T1	T2	T3
CO1	1,2,3,7		
CO2	3,4,5,6,8	1,2,7	
CO3		3,4,5,6,8	
CO4			1,2,3,5,6,8
CO5			4,5,7

	Program outcomes	CO_1															CO_2														CO_3										CO_4										co_5									
	COURSE OUTCOME																																																										
USN	Name																																																										
															SCORES OR GRADING														SCORES OR GRADING														SCORES OR GRADING															
		T1-Q1	T1-Q2	T1-Q3	T1-Q7								Total		percentage	BASED ON SCALE OF 3		Target ≥ 60	T1-Q3	T1-Q4	T1-Q5	T1-Q6	T1-Q8	T2-Q1	T2-Q2	T2-Q7	Total		percentage	BASED ON SCALE OF 3		Target ≥ 60	T2-Q3	T2-Q4	T2-Q5	T2-Q6	T2-Q8	Total		percentage	BASED ON SCALE OF 3		Target ≥ 60	T3-Q1	T3-Q2	T3-Q3	T3-Q5	T3-Q6	T3-Q8	Total		percentage	BASED ON SCALE OF 3		Target ≥ 60	T3-Q4	T3-Q5	T3-Q7	Total		percentage	BASED ON SCALE OF 3		Target ≥ 60
	MAXIMUM MARKS FOR QUESTION	10	10	10	10								40		%				10	10	10	10	10	10	10	10	80		%				10	10	10	10	10	50		%				10	10	10	10	10	10	60		%				10	10	10	30		%			
1BY20IS001	AAYUSHI JAISWAL	10			6								16	20	80	3	y			4		5	6		6	7	28	50	56	2				10	9		8	27	30	90	3	y	8		7		8	10	33	40	83	3	y			5	5	10	50	2	y
1BY20IS002	ABDUL SADIQ	10		9	8								27	30	90	3	y	9				6	10		5	3	33	50	66	3	y			10	10		9	29	30	97	3	y		10	8	10		10	38	40	95	3	y		10	10	20	20	100	3	y
1BY20IS003	ABHA NAIR	9			8								17	20	85	3	y		10			9	9		8	3	39	50	78	3	y			10	10		10	30	30	100	3	y		10	9	10		10	39	40	98	3	y		10	10	20	20	100	3	y
1BY20IS004	ABHINAV DADHICH	10			7								17	20	85	3	y		6			6	8		5	7	32	50	64	3	y			10	10		10	30	30	100	3	y	10		9	8		10	37	40	93	3	y		8	8	16	20	80	3	y
1BY20IS005	ABHINAV JHA	9		9	6								24	30	80	3	y	9				6	9		5	7	36	50	72	3	y			9	10		10	29	30	97	3	y	10		9	8		10	37	40	93	3	y		8	8	16	20	80	3	y
1BY20IS006	ABHISHEK KUMAR SINHA	9		9	6								24	30	80	3	y	9				6	8		8	7	38	50	76	3	y			10	8		10	28	30	93	3	y	8		7	8		10	33	40	83	3	y		8	4	12	20	60	3	y
1BY20IS007	ABHISHEK RAJ	8		9	6								23	30	77	3	y	9				8	8		4	7	36	50	72	3	y			10	10		10	30	30	100	3	y	10		5	9		10	34	40	85	3	y		9	4	13	20	65	3	y
1BY20IS008	ABHISHEK RAJPUT	9		4	2								15	30	50	2		4			3		4		8	7	26	50	52	2				9	6		10	25	30	83	3	y	9		7	9		10	35	40	88	3	y		9	4	13	20	65	3	y
1BY20IS009	ABHISHEK SHANKAR	0	7		6								13	20	65	3	y		6			5	9		8	8	36	50	72	3	y			6	8		10	24	30	80	3	y		8	7	8		10	33	40	83	3	y		8	6	14	20	70	3	y
1BY20IS010	ADDAGALLA SAI MANASWINI	9		9	8								26	30	87	3	y	9		8			9		8	8	42	50	84	3	y			10	9		10	29	30	97	3	y		10	8	9		10	37	40	93	3	y		9	8	17	20	85	3	y
1BY20IS011	ADDITHYA JOSHI		10		4								14	20	70	3	y		6	8		7			8	7	36	50	72	3	y			8	6		10	24	30	80	3	y		8	9	10		10	37	40	93	3	y		10	6	16	20	80	3	y
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1BY20IS015	AHAANA SINGH		10		10								20	20	100	3	y		9			10	9		6	8	42	50	84	3	y	10		9		8	27	30	90	3	y		10	8		9	10	37	40	93	3	y			9	9	10	90	3	y
1BY20IS016	AJAY V KAMATH	10		6	8								24	30	80	3	y	6	0			5	10		4	10	35	50	70	3	y			6	6		9	21	30	70	3	y	6		6	7		10	29	40	73	3	y		7	8	15	20	75	3	y
1BY20IS017	AKANKSH P N		9	0	6								15	20	75	3	y	0	9	8			9		8	7	41	50	82	3	y	6			9		9	24	30	80	3	y	7		9	9		10	35	40	88	3	y		9	4	13	20	65	3	y
1BY20IS018	AKHILA A R	9		9	6								24	30	80	3	y	9				7	9		8	7	40	50	80	3	y			10	8		10	28	30	93	3	y	10		9	9		10	38	40	95	3	y		9	10	19	20	95	3	y
1BY20IS019	AKSHAY KUMAR R	9		10	6								25	30	83	3	y	10				8	7		8	7	40	50	80	3	y			8	9		10	27	30	90	3	y		9	8		9	10	36	40	90	3	y			6	6	10	60	3	y
1BY20IS020	AMAN TRIPATHI	8			6								14	20	70	3	y		7			6	9		8	7	37	50	74	3	y			10	9		10	29	30	97	3	y	8		9	9		10	36	40	90	3	y		9	10	19	20	95	3	y
1BY20IS021	AMOGH YADWAD		6	6	5								17	30	57	2			6			6	9		7	7	35	50	70	3	y			6	4		10	20	30	67	3	y		7			5	10	22	30	73	3	y	6		4	10	20	50	2	
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1BY20IS023	ANAND BHARDWAJ	10			6								16	20	80	3	y			8		6	9		8	7	38	50	76	3	y			10	9		10	29	30	97	3	y	10		9	9		10	38	40	95	3	y		9	6	15	20	75	3	y
1BY20IS024	ANANDHU A	9		9	6								24	30	80	3	y	9		8		9			8	8	42	50	84	3	y			10	10		10	30	30	100	3	y	10		9		9	10	38	40	95	3	y			4	4	10	40	2	
1BY20IS025	ANANYA	9			6								15	20	75	3	y		9			8	8		6	7	38	50	76	3	y			10	9		10	29	30	97	3	y	10		9	9		10	38	40	95	3	y		9	6	15	20	75	3	y
1BY20IS026	ANANYA ANAND T		10		6								16	20	80	3	y		7			8	8		10	7	40	50	80	3	y			10	10		10	30	30	100	3	y		10	9	8		10	37	40	93	3	y		8	4	12	20	60	3	y
1BY20IS027	ANANYA DIXIT		10	9	8								27	30	90	3	y	9				10	9		10	10	48	50	96	3	y			10	10		10	30	30	100	3	y	10		9	10		10	39	40	98	3	y		10	10	20	20	100	3	y
1BY20IS028	ANANYA R	9			6								15	20	75	3	y		9			8	7		9	7	40	50	80	3	y			10	9		10	29	30	97	3	y	10		9	9		10	38	40	95	3	y		9	6	15	20	75	3	y
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1BY20IS031	ARPITHA A P	10		9	6								25	30	83	3	y	9				8	9		8	7	41	50	82	3	y			9	9		10	28	30	93	3	y		9	8	9		10	36	40	90	3	y		9	8	17	20	85	3	y
1BY20IS032	ASHISH SHARMA		9	7	6								22	30	73	3	y	7		8		6			8	7	36	50	72	3	y			9	10		10	29	30	97	3	y	10		8	9		10	37	40	93	3	y		9	6	15	20	75	3	y
1BY20IS033	ASISH MOHANTY		6	5	4								15	30	50	2			5			7	9		8	10	39	50	78	3	y			9	10		10	29	30	97	3	y		4			10	10	24	30	80	3	y	7		3	10	20	50	2	
1BY20IS034	ATHARV KULKARNI	10			6								16	20	80	3	y		9			8	10	4	2	7	40	60	67	3	y			9	9		10	28	30	93	3	y	7			9		10	26	30	87	3	y	9	9	6	24	30	80	3	y
1BY20IS035	AYAN AKASH	10		7	7								24	30	80	3	y	7				6	7		8	7	35	50	70	3	y			9	9		10	28	30	93	3	y		9	7	8		10	34	40	85	3	y		8	6	14	20	70	3	y
1BY20IS036	AZRA RUMANA	10		9	8								27	30	90	3	y	9				10	10	9	6	10	54	60	90	3	y	6		10		10	26	30	87	3	y		10	10	10		10	40	40	100	3	y		10	8	18	20	90	3	y
1BY20IS037	B AKSHAY	10		9	7								26	30	87	3	y	9				8	8		6	7	38	50	76	3	y			8	9		10	27	30	90	3	y		9			8	10	27	30	90	3	y	7		6	13	20	65	3	y
1BY20IS038	BACHU YOSHITHA	9			8								17	20	85	3	y			9	8		8		8	9	42	50	84	3	y			9	9		10	28	30	93	3	y		10	8	9		10	37	40	93	3	y		9	8	17	20	85	3	y
1BY20IS039	BASAWAKIRAN	10		8	5								23	30	77	3	y	8				6	9		6	4	33	50	66	3	y	5			9		9	23	30	77	3	y	7		8	8		10	33	40	83	3	y		8	6	14	20	70	3	y
1BY20IS040	BHAVYATHA M		9		8								17	20	85	3	y			10	10		10		8	7	45	50	90	3	y			8	9		10	27	30	90	3	y	7		8	9		10	34	40	85	3	y		9	6	15	20	75	3	y
1BY20IS041	BHUMIKA N DEEKSHITH		10		6								16	20	80	3	y		7		8	9		9	9	42	50	84	3	y			10	10		10	30	30	100	3	y		10		9		10	29	30	97	3	y	10	9	8	27	30	90	3	y
1BY20IS042	BONDADA DIVYA NAGA SURYA THANMAI	10			6								16	20	80	3	y		9			10	9		8	8	44	50	88	3	y			8	6		10	24	30	80	3	y		9	9	9		10	37	40	93	3	y		9	8	17	20	85	3	y
1BY20IS043	BONTHALA SHARATH CHANDRA	9		8	6								23	30	77	3	y	8		8		8			8	7	39	50	78	3	y			7	9		10	26	30	87	3	y		10	7	8		10	35	40	88	3	y		8	8	16	20	80	3	y
1BY20IS044	C B SURAJ KRISHNAN	8		5									13	20	65	3	y	5		2					10	3	20	40	50	2		8		4	8	20	30	67	3	y	9		3		9	10	31	40	78	3	y		6	6	10	60	3	y
1BY20IS045	CHANDANA G R	9		8	8								25	30	83	3	y	8				8	9		8	5	38	50	76	3	y	10		9		10	29	30	97	3	y	10			9		10	29	30	97	3	y	9	9	4	22	30	73	3	y
1BY20IS046	DARSHAN KUMAR N	10			6								16	20	80	3	y		10			7	9		8	7	41	50	82	3	y	8			9		10	27	30	90	3	y	7					10	10	27	30	90	3	y	6		3	9	20	45	2	
1BY20IS047	DEEPANSHU KUMAR		9		6								15	20	75	3	y		6			6	9		8	7	36	50	72	3	y			8	9		10	27	30	90	3	y		9				10	29	30	97	3	y	10		8	18	20	90	3	y
1BY20IS048	DHANUSH H V		9	8									17	20	85	3	y	8				5	8		8		29	40	73	3	y			9	9		10	28	30	93	3	y	7		8			8	10	33	40	83	3	y			0	0	0	0		
1BY20IS049	DHANYASHREE PARAMESHWAR BHAT	9		9	6								24	30	80	3	y	9				10	10		8	10	47	50	94	3	y			9	9		10	28	30	93	3	y	10					9	10	29	30	97	3	y	10		10	20	20	100	3	y
1BY20IS050	DIKSHITRE SOHAM VIJAYKUMAR		8	7	3								18	30	60	3	y	7				5	5		7	10	34	50	68	3	y			9	10		10	29	30	97	3	y	10		8	9		10	37	40	93	3	y		9	3	12	20	60	3	y
1BY20IS051	DHRUV K		9	8	7								24	30	80	3	y	8		8			8		8	7	38	50	76	3	y			8	9		10	27	30	90	3	y	5		7		10	10	32	40	80	3	y			5	5	10	50	2	
1BY20IS052	DHRUVA S KASHYAP	6			6								12	20	60	3	y		5			5	3		8	7	28	50	56	2				8	9		10	27	30	90	3	y	7			7		10	24	30	80	3	y	8	7	4	19	30	63	3	y
1BY20IS053	DILPREET KAUR		8	9	6								23	30	77	3	y	9				8	9		8	7	41	50	82	3	y			8	9		10	27	30	90	3	y	7		8		8	10	33	40	83	3	y			6	6	10	60	3	y
1BY20IS054	DIVYASHREE S	10		9	10								29	30	97	3	y	9				10	9		8	10	46	50	92	3	y	10		10		9	10	30	30	100	3	y	10		10		9	10	39	40	98	3	y			10	10	10	100	3	y
1BY20IS055	DUDDELA RAMA KEERTHANA	9			5								14	20	70	3	y		8			8	6		8	7	37	50	74	3	y			10	9		10	29	30	97	3	y		10	8	9		10	37	40	93	3	y		9	6	15	20	75	3	y
1BY20IS056	GARVIT VASTAWAT		9		8								17	20	85	3	y		9	8		8			7	7	39	50	78	3	y			9	9		10	28	30	93	3	y		10	8		8	10	36	40	90	3	y			6	6	10	60	3	y
1BY20IS057	GAURAV R M	9		9	4								22	30	73	3	y	9				10	8		8	7	42	50	84	3	y			8	9		10	27	30	90	3	y	7			8		10	25	30	83	3	y	8	8	6	22	30	73	3	y
1BY20IS058	GAUTAMI RAKESH		10		5								15	20	75	3	y		5			7	8		5	7	32	50	64	3	y			8	9		8	25	30	83	3	y	10		8	8		10	36	40	90	3	y		8	4	12	20	60	3	y
1BY20IS059	HARSH SINGH	10			6								16	20	80	3	y		9			8	8				25	30	83	3	y							0	0	0	0		7		9	9		10	35	40	88	3	y		9	5	14	20	70	3	y
1BY20IS060	HARSHINI K		10		3								13	20	65	3	y		5	8		9	8		5	35	50	70	3	y			10	10		3	23	30	77	3	y	7		8	10		10	35	40	88	3	y		10	8	18	20	90	3	y
1BY20IS061	INNAMURI SREELASYA	10		9	5								24	30	80	3	y	9		8		9			10	5	41	50	82	3	y	9			4		10	23	30	77	3	y		10	9	10		10	39	40	98	3	y		10	8	18	20	90	3	y
1BY20IS062	ITISH AGARWAL	9			6								15	20	75	3	y		9			8	8		8	7	40	50	80	3	y			8	9		10	27	30	90	3	y		10	9		8	10	37	40	93	3	y			4	4	10	40	2	
1BY20IS063	JEEVAN KUMAR S V	10			6								16	20	80	3	y		10			9	9		8	10	46	50	92	3	y			9	9		10	28	30	93	3	y		10				8	10	28	30	93	3	y	9		6	15	20	75	3	y
1BY20IS064	JHANSI PRIYA S		10		6								16	20	80	3	y		9			10	9	10		7	45	50	90	3	y			9	10		10	29	30	97	3	y	10		5	7	10	10	42	50	84	3	y		7	6	13	20	65	3	y
																CO1	95.30%												CO2	93.75%										CO3	98.40%										CO4	100.00%										CO5	84.40%	
																61													60										63										64								54		

	CO RESULT	PO1	PO2	PO3	PO4	PO5	PO7	PO8
CO1: Understand the concept of free energy in equilibria and apply thermodynamic principles for the evaluation of		3	2	1		1		
CO2: Evaluate the causes & effects of corrosion of metals and to prevent corrosion. Surface modification of metals to enhance		3	2	1		1		
CO3: Identify sustainable energy sources and its utilization for the improved living standards of		3	2	1		1	1	
CO4: Analyze the impact of various types of pollution on environment and human beings and to control the		3	2				1	2
CO5: Quantitative and qualitative analysis of materials by using different instruments. Understand the importance of nanomaterials and to study synthesis, properties and		3	2	1	2	1		
	CIII*	**3**	**2**	**1**	**2**	**1**	**1**	**2**

SUBJECT / PO	PO1	PO2	PO3	PO4	PO5	PO7	PO8
CO ATTAINMENT FOR II-D-ISE 2020- 2021, 18CHE22	3	2	1	2	1	1	2

BMS INSTITUTE OF TECHNOLOGY & MANAGEMENT - BANGALORE

Chemistry LAB Final Exam Results Information Science Engineering DEC 2020-APRIL 2021

COURSE OUTCOMES	ATTAINMENT LVL-I A	ATTAINMENT LVL-UNIVERSITY	OVERALL ATTAINMENT LVL
CO1	3.00	3.00	3
CO2	3.00	3.00	3
			6

Sl No	USN	NAME	EXT	Percentage	Grade	Target>=60%
1	1BY20IS001	AAYUSHI JAISWAL	66	66	3	Y
2	1BY20IS002	ABDUL SADIQ	84	84	3	Y
3	1BY20IS003	ABHA NAIR	95	95	3	Y
4	1BY20IS004	ABHINAV DADHICH	86	86	3	Y
5	1BY20IS005	ABHINAV JHA	80	80	3	Y
6	1BY20IS006	ABHISHEK KUMAR SINHA	65	65	3	Y
7	1BY20IS007	ABHISHEK RAJ	40	40	2	-
8	1BY20IS008	ABHISHEK RAJPUT	65	65	3	Y
9	1BY20IS009	ABHISHEK SHANKAR	68	68	3	Y
10	1BY20IS010	ADDAGALLA SAI MANASWINI	83	83	3	Y
11	1BY20IS011	ADDITHYA JOSHI	70	70	3	Y
12	1BY20IS012	ADITI MALLICK	82	82	3	Y
13	1BY20IS013	ADITYA GOUR	85	85	3	Y
14	1BY20IS014	ADITYA PAL	73	73	3	Y
15	1BY20IS015	AHAANA SINGH	94	94	3	Y
16	1BY20IS016	AJAY V KAMATH	89	89	3	Y
17	1BY20IS017	AKANKSH P N	79	79	3	Y
18	1BY20IS018	AKHILA A R	87	87	3	Y
19	1BY20IS019	AKSHAY KUMAR R	50	50	2	-
20	1BY20IS020	AMAN TRIPATHI	80	80	3	Y
21	1BY20IS021	AMOGH YADWAD	46	46	2	-
22	1BY20IS022	AMRUTHA T MADIHALLI	83	83	3	Y
23	1BY20IS023	ANAND BHARDWAJ	87	87	3	Y
24	1BY20IS024	ANANDHU A	86	86	3	Y
25	1BY20IS025	ANANYA	86	86	3	Y
26	1BY20IS026	ANANYA ANAND T	61	61	3	Y
27	1BY20IS027	ANANYA DIXIT	83	83	3	Y
28	1BY20IS028	ANANYA R	86	86	3	Y
29	1BY20IS029	ANUP G	70	70	3	Y
30	1BY20IS030	ANUSHA B N	87	87	3	Y
31	1BY20IS031	ARPITHA A P	86	86	3	Y
32	1BY20IS032	ASHISH SHARMA	66	66	3	Y
33	1BY20IS033	ASISH MOHANTY	50	50	2	-
34	1BY20IS034	ATHARV KULKARNI	84	84	3	Y
35	1BY20IS035	AYAN AKASH	80	80	3	Y
36	1BY20IS036	AZRA RUMANA	88	88	3	Y
37	1BY20IS037	B AKSHAY	64	64	3	Y
38	1BY20IS038	BACHU YOSHITHA	70	70	3	Y
39	1BY20IS039	BASAWAKIRAN	72	72	3	Y
40	1BY20IS040	BHAVYATHA M	70	70	3	Y
41	1BY20IS041	BHUMIKA N DEEKSHITH	80	80	3	Y
42	1BY20IS042	BONDADA DIVYA NAGA SURYA	81	81	3	Y

43	1BY20IS043	BONTHALA SHARATH CHANDRA	57	57	2	-
44	1BY20IS044	C B SURAJ KRISHNAN	64	64	3	Y
45	1BY20IS045	CHANDANA G R	85	85	3	Y
46	1BY20IS046	DARSHAN KUMAR N	80	80	3	Y
47	1BY20IS047	DEEPANSHU KUMAR	89	89	3	Y
48	1BY20IS048	DHANUSH H V	53	53	2	-
49	1BY20IS049	DHANYASHREE PARAMESHWAR BHAT	85	85	3	Y
50	1BY20IS050	DHOTRE SOHAM VIJAYKUMAR	85	85	3	Y
51	1BY20IS051	DHRUV K	60	60	3	Y
52	1BY20IS052	DHRUVA S KASHYAP	51	51	2	-
53	1BY20IS053	DILPREET KAUR	78	78	3	Y
54	1BY20IS054	DIVYASHREE S	92	92	3	Y
55	1BY20IS055	DUDDELA RAMA KEERTHANA	79	79	3	Y
56	1BY20IS056	GARVIT VASTAWAT	81	81	3	Y
57	1BY20IS057	GAURAV R M	85	85	3	Y
58	1BY20IS058	GAUTAMI RAKESH	70	70	3	Y
59	1BY20IS059	HARSH SINGH	85	85	3	Y
60	1BY20IS060	HARSHINI K	74	74	3	Y
61	1BY20IS061	INNAMURI SREELASYA	90	90	3	Y
62	1BY20IS062	ITISH AGARWAL	86	86	3	Y
63	1BY20IS063	JEEVAN KUMAR S V	74	74	3	Y
64	1BY20IS064	JHANSI PRIYA S	92	92	3	Y
			SUM	4882		
			AVG	76.28		

3	57	89.1
2	7	10.9
1	0	0.0
Total No of Students	64	

TARGET is 60% marks. And more than 60% of students must achieve 60% marks.

Grading Scale		
SCORE :50% to <55% :		1
55 to <60% :		2
>=60% :		3

Exam results				
GRADING AVG ON SCALE OF		DISTRIBUTION %		
3		3	2	1
76.28		89.1	10.9	0.0

	CO RESULT	PO1	PO2	PO4	PO5
CO1: Handling different types of instruments for analysis of materials using small quantities of materials involved for quick and accurate results	3	3	1	2	1
CO2:Carrying out different types of titrations for estimation of concerned in materials using comparatively more quantities of materials involved for good results	3	3	1	2	1
Ciii*		3	1	2	1

SUBJECT / PO	PO1	PO2	PO4	PO5
CO ATTAINMENT FOR II-D-ISE 2020- 2021, 18CHEL26	3	1	2	1