Re-Accredited 'B++' 2.86 CGPA by NAAC
VEER NARMAD SOUTH GUJARAT UNIVERSITY
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વીર નર્મદ દક્ષિણ ગુજરાત યુનિવર્સિટી
યુનિવર્સિટી કેમ્પસ, ઉધના-મગદલ્લા રોડ, સુરત - ૩૯૫ ૦૦૭, ગુજરાત, ભારત.
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–:પરિપત્ર:–

યુનિવર્સિટી સંલગ્ન વિજ્ઞાન વિદ્યાશાખા હેઠળની તમામ કોલેજોનાં આચાર્યશ્રીઓને જણાવવાનું કે, શૈક્ષણિક વર્ષ ૨૦૨૬–૨૭ થી અમલમાં આવનાર B.Sc. Chemistry સેમેસ્ટર–૫ નું પેપર નંબર–૫૦૧ અને ૫૦૩ માં IKS ના યુનિટને સ્થાને કેમેસ્ટ્રીના યુનિટ મૂકવા સંદર્ભે રસાયણશાસ્ત્ર વિષયની અભ્યાસ સમિતિની તા.૨૦/૦૧/૨૦૨૬ ની સભાના ઠરાવ ક્રમાંકઃ૦૫ થી B.Sc. Chemistry સેમેસ્ટર–૫ નું પેપર નંબર– ૫૦૧ અને ૫૦૩ માં IKS ના યુનિટને સ્થાને કેમેસ્ટ્રીના યુનિટ મૂકી સુધારેલ અભ્યાસક્રમ મંજૂર કરવા વિજ્ઞાન વિદ્યાશાખાને કરેલ ભલામણ વિજ્ઞાન વિદ્યાશાખાની તા.૦૪/૦૬/૨૦૨૬ ની સભાના ઠરાવ ક્રમાંકઃ૧૦ થી મંજૂર કરવા એકેડેમિક કાઉન્સિલને કરેલ ભલામણ એકેડેમિક કાઉન્સિલની તા.૧૮/૦૬/૨૦૨૬ ની સભાના ઠરાવ ક્રમાંકઃ૦૮ થી મંજૂર કરેલ છે. જેનો અમલ કરવા આથી જાણ કરવામાં આવે છે.

(બિડાણઃ ઉપર મુજબ)

ક્રમાંકઃઓથો./પરિપત્ર/૧૩૬૨૩/૨૦૨૬
તા.૧૯/૦૬/૨૦૨૬

કુલસચિવ

પ્રતિ,
(૧) યુનિવર્સિટી સંલગ્ન વિજ્ઞાન વિદ્યાશાખા હેઠળની તમામ કોલેજોનાં આચાર્યશ્રીઓ.
..... આપશ્રીની કોલેજના સંબંધિત શિક્ષકો/વિદ્યાર્થીઓને જાણ કરી અમલ કરવા સારૂ.
(૨) અધ્યક્ષશ્રી, વિજ્ઞાન વિદ્યાશાખા.
(૩) પરીક્ષા નિયામકશ્રી, પરીક્ષા વિભાગ, વીર નર્મદ દ. ગુ. યુનિવર્સિટી, સુરત.
.....તરફ જાણ તેમજ અમલ સારૂ.

[Subject code for Theory-2503000505012001]
[Subject code for Practical-2503000505012002]

VEER NARMAD SOUTH GUJRAT UNIVERSITY, SURAT

Proposed Syllabus effective from June, 2026

For

T. Y. B. Sc. Semester-V

Major Course

Chemistry Paper-VI [Inorganic Chemistry]

Total credit: 02 (Theory-2)

Total Hrs: Theory-30

CH-MJ-501 (Theory)

Course Code	CH-MJ-501	Title of the Course	Chemistry Paper-VI [Inorganic Chemistry]
Total Credits of the Course	2	Hours per week	2 Hrs.

Course Outcome: Having Completed this course, the learner will be able to	
1.	To understand shape of different hybridization scheme.
2.	To understand the stability of metal complexes, lability and inertness of the complexes.
3.	Detect distortion of Octahedral complexes. Application of molecular energy diagram and magnetic properties of complexes.
4.	Learn different types of corrosion and their protection.

Unit-1

[A] Hybridization [7 hrs.]

- Introduction, Rules for hybridization
- Bond angles bond strength and co-efficient in sp, sp^2, and sp^3 hybrid orbital using wave function (Fully mathematical calculations).

[B] Corrosion and its Protection [8 hrs.]

- Definition and importance of corrosion
- Types of corrosion: uniform, pitting, inter crystalline and stress cracking corrosion
- Electro – chemical theory of corrosion.
- Protection methods: Coating, Inhibitors (Organic, Inorganic, anodic, cathodic)
- Anodic and Cathodic protection.

Unit-2

[A] Metal Carbonyl [7 hrs.]

- Definition.
- Classification of metal carbonyl.

- Nature of Bonding in metal carbonyls.
- Structure and bonding in $Ni(CO)_4$, $Fe(CO)_5$, $Cr(CO)_6$, $Fe_2(CO)_9$, $Mn_2(CO)_{10}$, $Co_2(CO)_8$.

[B] Bonding in transition Metal Complexes **[8 hrs.]**

- Jahn Teller Theorem
- Distortion in octahedral complexes.
- Ligand Field Theory.
- Molecular energy level diagram and magnetic properties for $[CoF_6]^{3-}$, $[Co(NH_3)_6]^{3+}$, $[FeF_6]^{3-}$, $[Fe(CN)_6]^{3-}$
- π-bonding in octahedral complexes.

Reference books:

1) Advanced Inorganic Chemistry by Cotton and Wilkinson, John Wiley.
2) Inorganic Chemistry by J. D. Lee.
3) Theoretical Inorganic Chemistry by Day & Selbin, Affiliated East West Publ. Pvt. Ltd.
4) Uni. Chemistry by B. H. Mohan.
5) Structural Inorganic chemistry by A. F. Wells.
6) Chemical Bonding – an introduction by Rawal, Patel & Patel.
7) Basic Inorganic Chemistry by Cotton and Wilkinson.
8) A Text book of Inorganic Chemistry by P. L. Soni.
9) Introduction to Inorganic Chemistry by Durrant and Durrant.
10) Modern Co – ordination Chemistry by R, Lewis and R. G. Wilkinson.
11) Inorganic Chemistry – Principles of structure and reactivity by J. E. Huhhey and E. A. keiter.
12) Corrosion and Corrosion Control, Uhlig H., Wiley.
13) Corrosion Engineering by Fontana M.G. and Green N.D., Mc Graw Hi.
14) Corrosion, Causes and Prevention, Speller. F.,Mc Grqw Hill,New york.
15) Dhatvik Ksharan, Part-I & II by M.N. Desai, Uni. Granth Nirman Board (Gujarat).

[Subject code for Theory-2503000505032001]

[Subject code for Practical-2503000505032002]

VEER NARMAD SOUTH GUJARAT UNIVERSITY

T. Y. B. Sc. – SEM – V CHEMISTRY (MAJOR)

PAPER - CH-MJ-503

Physical Chemistry (Major) (2 Credits Theory + 2 Credits Practical)

As per NEP 2020

To be implemented from the Academic year 2026-27

Course Subject Code	CH-MJ-503
Subject Title	Physical Chemistry (Theory)
Credits	02
Teaching per week	02 Hours
Effective from	2026-2027
Purpose of Course	This course aims to provide students with a deep understanding of thermodynamics, electrochemistry, and their applications, highlighting the contributions of Indian and global scientists in advancing these fields.
Objective of Course	Students will explore fundamental thermodynamic principles, chemical potential, fugacity, and the third law of thermodynamics while learning about electrochemical cells, electrode potentials, and the thermodynamics of electrochemical reactions. The course integrates theoretical concepts with real-world applications, emphasizing their significance in energy conversion, materials science, and industrial processes.
Course Outcomes	**CO1-Remembering:** Students will recall fundamental thermodynamic and electrochemical concepts, including the third law, chemical potential, fugacity, electrode potential, and electrochemical cells. **CO2-Understanding:** Students will explain the contributions in thermodynamics and electrochemistry, highlighting their impact on modern scientific advancements. **CO3-Application:** Students will explain the contributions in thermodynamics and electrochemistry, highlighting their impact on modern scientific advancements. **CO4-Analysis:** Students will analyse the thermodynamics of electrochemical cells, entropy changes, and energy relationships to predict reaction spontaneity and equilibrium conditions. **CO5-Evaluation:** Students will evaluate different electrochemical cell classifications, electrode potentials, and thermodynamic parameters, comparing their efficiencies and industrial applications. **CO6-Creation:** Students will design and propose innovative approaches to thermodynamic and electrochemical applications, such as battery technology and sustainable energy solutions.

Mapping Between COs and PSOs

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1	✓	✓	✓	✓		✓	✓	
CO2	✓		✓	✓	✓	✓	✓	
CO3		✓	✓	✓	✓	✓		✓
CO4	✓		✓	✓	✓	✓	✓	
CO5		✓	✓	✓	✓	✓		✓
CO6		✓		✓	✓	✓	✓	✓

CH-MJ-503 (Physical Chemistry)

Program Name: T. Y. B. Sc. Sem. – V

Syllabus effective from June 2026 (Revised)

Unit – 1 Thermodynamics		
	Chemical Potential and Fugacity in Thermodynamics • System – Open, Closed, and Isolated. • Chemical potential (μ) or Partial molal free energy • Derivation of Gibb's – Duhem equation • Derivation of chemical potential (μ) equation for an ideal gas • Lewis fugacity concept, fugacity function and its physical significance • Concept of Activity and activity coefficient • Name of methods to determine fugacity • Determination of fugacity by graphical method. • Concept of activity and activity coefficient • Standard state of solid, liquid and gas • Numerical problems **The Third Law of Thermodynamics** • The Nernst Heat Theorem (NHT) and its limitation • Statement of third law by Plank, Lewis – Randall • Consequences of third law of thermodynamics • Relation between Residual entropy and Boltzmann constant • Determination of absolute entropy of gas, liquid and solid • Application, importance and exception of third law of thermodynamics • Numerical problems.	**15 h**
Unit – 2 Electrochemistry		**15 h**
	Electrodics: • Concept of oxidation and reduction, electrochemical series • Definition of electrode, standard electrode, half-cell, single electrode potential • Sign convention of electrode potential • Galvanic cell with example of Daniel cell • emf of a cell and its measurements by voltmeter and potentiometer • Standard cell (Western cell) • Primary and secondary electrode, Standard hydrogen electrode [SHE] and Calomel electrode. **Thermodynamics of electrochemical cell:** • Flow diagram of electrochemical cell • Reaction in reversible cell and concept of thermodynamics reversibility • Reversible and irreversible electrochemical cell • Relation between free energy change and electrical energy • Prediction of spontaneity of cell reaction • Determination of standard free energy change and equilibrium constant	

	• Temperature coefficient of emf of a cell • Entropy change and enthalpy change of cell reaction **Classification of electrochemical cell:** • Chemical and concentration cell • Liquid Junction Potential (LJP), Methods for elimination of LJP (salt bridge) • Derivation of emf of concentration cell with and without transference. • **Application of electrochemistry in battery**: Li ion cell and Ni-Cd cell. • Numerical problems.	

Reference Books:

1. Physical chemistry by B.K. Sharma
2. Elemental physical chemistry by Glasston & Lewis
3. Advance physical chemistry by D.N. Bajpai
4. Essential of physical chemistry by Bahl, Tuli & Bahl
5. Physical chemistry by Gurdeep Raj
6. Physical chemistry by K.L. Kapoor
7. Physical chemistry by Puri, Sharma, and Pathania
8. A textbook of physical chemistry by A. S. Negi & Anand
9. Physical chemistry by P.L. Soni & O.P. Dharmraj
10. Physical chemistry by K.K. Sharma & L.K. Sharma
11. Industrial chemistry by B.K. Sharma
12. Electro chemistry by B.K. Sharma
13. Modern Electrochemistry by J'om Bockris and Reddy
14. Physical chemistry by G.M. Barrow
15. Numerical problems by D.V.S Jain