

# ACADEMIC PLANNER & UNITIZATION OF SYLLABUS

Department of Chemistry

Bankura Christian College

ACADEMIC YEAR: 2023-24 (Even Semester: January, 2023 to June, 2023)

4<sup>th</sup> Semester (GE) Theory

GE T4: Inorganic Chemistry-III, Analytical and Industrial Chemistry

Name of faculty member: Dr.SaugataSain

## Unit – 1:

Transition Elements (3d series):

- a. General group trends with special reference to electronic configuration, variable valency, colour, magnetic and catalytic properties, ability to form complexes and stability of various oxidation states (Latimer diagrams) for Mn, Fe and Cu.
- b. Lanthanoids and actinoids: Electronic configurations, oxidation states, colour, magnetic properties, lanthanide contraction, separation of lanthanides (ion exchange method only).

## Unit – 2:

Coordination Chemistry:

- a. Werner's coordination theory, Valence Bond Theory (VBT): Inner and outer orbital complexes of Cr, Fe, Co, Ni and Cu (coordination numbers 4 and 6). Structural and stereoisomerism in complexes with coordination numbers 4 and 6.
  - b. Drawbacks of VBT. IUPAC system of nomenclature.
3. Crystal Field Theory
- Crystal field effect, octahedral symmetry. Crystal field stabilization energy (CFSE), Crystal field effects for weak and strong fields. Tetrahedral symmetry. Factors affecting the magnitude of D. Spectrochemical series. Comparison of CFSE for Oh and Td complexes, Tetragonal distortion of octahedral geometry. Jahn-Teller distortion, Square planar coordination.

## Unit – 3:

Error Analysis and Computer Applications

Error analysis: accuracy and precision of quantitative analysis, determinate, indeterminate, systematic and random errors; methods of least squares and standard deviations.

## Unit – 4:

Industrial Chemistry:

- a. Fuels: classification of fuel; heating values; origin of coal, carbonization of coal, coal gas, producer gas, water gas, coal based chemicals; origin and composition of petroleum, petroleum refining, cracking, knocking, octane number, antiknock compounds, kerosene, liquefied petroleum gas (LPG), liquefied natural gas (LNG); petrochemicals (C1 to C3 compounds and their uses).
- b. Fertilizers: manufacture of ammonia and ammonium salts, urea, superphosphate, biofertilizers.
- c. Cement: portland cement: composition and setting of cement, white cement.

MONTH	WEEK	TOPICS TO BE TAUGHT
March	2	General group trends with special reference to electronic configuration, variable valency, colour, magnetic and catalytic properties, ability to form complexes and stability of various oxidation states (Latimer diagrams) for Mn, Fe and Cu.
March	3	Lanthanoids and actinoids: Electronic configurations, oxidation states, colour, magnetic properties, lanthanide contraction, separation of lanthanoids (ion exchange method only).
March	4	Werner's coordination theory, Valence Bond Theory (VBT): Inner and outer orbital complexes of Cr, Fe, Co, Ni and Cu (coordination numbers 4 and 6). Structural and stereoisomerism in complexes with coordination numbers 4 and 6.
April	1	Drawbacks of VBT, IUPAC system of nomenclature, Crystal Field Theory: Crystal field effect, octahedral symmetry. Crystal field stabilization energy (CFSE).
April	2	Crystal field effects for weak and strong fields. Tetrahedral symmetry. Factors affecting the magnitude of D. Spectrochemical series. Comparison of CFSE for Oh and Td complexes, Tetragonal distortion of octahedral geometry. Jahn-Teller distortion, Square planar coordination.
April	3	Revision of Unit-1 & Unit-2
April	4	Error analysis: accuracy and precision of quantitative analysis, determinate, indeterminate, systematic and random errors; methods of least squares and standard deviations
May	1	Industrial Chemistry: Fuels: classification of fuel; heating values; origin of coal, carbonization of coal, coal gas, producer gas, water gas, coal based chemicals;
May	2	Origin and composition of petroleum, petroleum refining, cracking, knocking, octane number and antiknock compounds.
May	3	Kerosene, liquefied petroleum gas (LPG), liquefied natural gas (LNG), petrochemicals (C1 to C3 compounds and their uses).
May	4	Fertilizers: manufacture of ammonia and ammonium salts, urea, superphosphate, biofertilizers.
June	1	Cement: portland cement: composition and setting of cement, white cement
June	2	Revision of Unit-3 & Unit-4
June	3	Class test: Unit-1 & Unit-2
June	4	Class test: Unit-3 & Unit-4