FACULTY OF LIFE SCIENCES

SYLLABUS

of

Chemistry

for

Bachelor of Science (Biotechnology) (Semester I)

(Under Credit Based Continuous Evaluation Grading System)

Session: 2023-24

The Heritage Institution

KANYA MAHA VIDYALAYA

JALANDHAR

(Autonomous)

KANYA MAHA VIDYALAYA JALANDHAR (AUTONOMOUS)

SCHEME AND CURRICULUM OF EXAMINATION OF THREE YEAR DEGREE PROGRAMME

Bachelor of Science (Biotechnology)

Credit Based Continuous Evaluation Grading System (CBCEGS)
(Session: 2023-2024)

Bachelor of Science (Biotechnology) Semester-I										
Course Code	**Course Title**	**Course Type**	**Hours Per Week L-T-P**	**Credits L-T-P**	**Total Credits**	**Marks**				**Examination time (in Hours)**
						Total	Th	P	CA	
BBTL-1087	Chemistry-I	C	3-0-0	3-0-0	3	50	40	-	10	3
BBTP-1082	Lab in Chemistry-I	C	0-0-3	0-0-1.5	1.5	25	-	20	05	3.5

Bachelor of Science (Biotechnology)
(Semester-I)
Session: 2023-24
Course Code: BBTL-1087
COURSE TITLE: Chemistry-I
(Theory)

Course outcomes:

Students will be able to:

CO1: understand the key features of coordination compounds viz.variety of structures, oxidation numbers and electronic configurations, coordination numbers and explain the bonding and stability of complexes along with their nomenclature and structure.

CO2: understand the postulates of VBT, inner and outer orbital complexes

CO3: describe the stability of metal complexes by the use of formation constants and to calculate thermodynamic parameters from them, understand macrocyclic effect, crown ethers, cryptands

CO4: understand Crystal field splitting of d-orbitals in octahedral, tetrahedral, cubic and square planer fields of ligands.

Bachelor of Science (Biotechnology)
(Semester-I)
Session: 2023-24
Course Code: BBTL-1087
COURSE TITLE: Chemistry-I
(Theory)

Exam Time: 3Hrs. **Max.Marks:50**
Credit(L-T-P): 3-0-0 **(Theory: 40, CA: 10)**

Instructions for the Paper Setters:
Eight questions of equal marks (eight marks each) are to be set, two in each of the four Sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any Section.

Unit-I

Introduction, Werner's coordination theory, naming of co-ordinate complexes.

Co-ordination numbers 1-12. Factors affecting co-ordination numbers and stereo-chemistry, Isomerism in coordination compounds.

Unit-II

Valence bond theory for co-ordinate complexes, inner and outer orbital complexes, electro-neutrality and back bonding, limitations of V.B. theory.

Unit-lll

Stability of co-ordination compounds

Introduction Factors affecting the stability of metal ion complexes with general ligands

Alkali metal and alkaline earth metal chelators: Definition and few examples of macrocyclic ligands, macrocyclic effect, crown ethers and cryptands.

Unit-IV

Crystal field theory-Splitting of d-orbitals in octahedral, tetrahedral, cubic and square planer fields of ligands, calculations of C.F.S.E. in high spin and low spin octahedral and high spin tetrahedral complexes, factors affecting the 10 Dq value.

Books Recommended:
1. G.L. Eichorn, Inorganic Biochemistry, Vol. I Elsevier,
2. J.E. Huheey, E.A. Keiter, R.L. Keiter, Inorganic Chemistry, 4th ed. Pearson Education, Singapore, 1999.
3. D.F.C Shriver, P.W. Atkins and C.H. Langford, Inorganic Chemistry, ELBS Oxford, 1991.
4. Cowan, J.A. (1997) – Inorganic Biochemistry – An Introduction, Wiley- VCH

Bachelor of Science (Biotechnology)
(Semester-I)
Session: 2023-24
Course Code: BBTP-1082
COURSE TITLE: Lab in Chemistry-I
(Practical)

Course outcomes:

Students will be able to:

CO1: understand the technique of volumetric analysis

CO2: understand Iodimetry, Iodometry

CO3: understand Redox titrations using $K_2Cr_2O_7$ and $KMnO_4$.

CO4: identify the various ions present in the mixture.

Bachelor of Science (Biotechnology)
(Semester-I)
Session: 2023-24
Course Code: BBTP-1082
COURSE TITLE: Lab in Chemistry-I
(Practical)

Exam Time: 3.5 Hrs **Max. Marks: 25**

Credit (L-T-P): 0-0-1.5 **(Practical: 20, CA: 05)**

Insructions for the practical Examiner: Question paper is to be set on the spot jointly by the internal and external examiners. Two copies of the same may be submitted for the record to COE Office, Kanya Maha Vidyalaya, Jalandhar.

Experiments

Volumetric Analysis:

Iodimetry, Iodometry, Redox titrations using $K_2Cr_2O_7$ and $KMnO_4$.

Inorganic qualitative analysis:

Four ions (Two cations two anions).

A. Preliminary tests: Physical examination, Dry heating test, charcoal cavity test,

$Co(NO_3)_2$ test, flame test, borax bead test.

B. Acid radical analysis:

Dil. H_2SO_4 group: CO^{2-}_3, NO^-_2, S^{2-}, SO_3^{2-}

Conc, H_2SO_4 group: Cl^-, Br^-, I^-, NO_3^-, CH_3COO^-

Individual group: SO_4^{2-}, PO_4^{3-}, BO_3^{3-}

C. Basic radical analysis:

NH_4^+ Pb^{2+}, Cu^{2+}, Cd^{2+}, Fe^{2+} or Fe^{3+}, Al^{3+}, Co^{2+}, Ni^{2+}, Mn^{2+}, Zn^{2+}, Ba^{2+}, Sr^{2+}, Ca^{2+} Mg^{2+}, Na^+, K^+ and their confirmation.

Book recommended:

G. Svehla, B. Sivasankar, Vogels Qualitative Inorganic Analysis 7 Edition, 2012