FACULTY OF SCIENCES

SYLLABUS

For

BACHELOR OF SCIENCE (Non-Medical)

(Semester I-VI)

(Under Continuous Evaluation System)

Session: 2021-22

The Heritage Institution

KANYA MAHA VIDYALAYA JALANDHAR (AUTONOMOUS)

Kanya Maha Vidyalaya, Jalandhar (Autonomous)

CURRICULUM AND SCHEME OF EXAMINATIONS OF THREE YEAR DEGREE PROGRAM

BACHELOR OF SCIENCE (Non-Medical)

Session-2021-2022

Bachelor of Science(Non-Medical) **Semester I**								
Course Code		**Course Name**	**Course Type**	**Total**	**Ext.**		**CA**	**Examination time (in Hours)**
					L	**P**		
BSNL-1421 BSNL-1031 BSNL-1431		Punjabi (Compulsory) [1]Basic Punjabi [2]Punjab History & Culture	C	50	40	-	10	3
BSNl-1212		English (Compulsory)	C	50	40	-	10	3
BSNM-1333	(I)	**Mathematics** (Algebra)	C	100	80 (40+40)	-	20	3+3
	(II)	**Mathematics** (Calculus and Trigonometry)						
BSNM-1084	(I)	**Chemistry** (Inorganic Chemistry)	C	100	60 (30+30)	20	20	3+3+3½
	(II)	**Chemistry** (Organic Chemistry)						
	(P)	**Chemistry** (Practical)						
BSNM-1395	(I)	**Physics** (Mechanics)	C	100	60 (30+30)	20	20	3+3+3
	(II)	**Physics** (Electricity And Magnetism)						
	(P)	**Physics** (Practical)						
AECD-1161		*Drug Abuse: Problem Management and Prevention (Compulsory)	AC	50	40	-	10	3
SECF-1492		*Foundation Programme	AC	25	25	-	-	2
Total				400				

Kanya Maha Vidyalaya, Jalandhar (Autonomous)

CURRICULUM AND SCHEME OF EXAMINATIONS OF THREE YEAR DEGREE PROGRAM

BACHELOR OF SCIENCE (Non-Medical)

Session-2021-2022

BACHELOR OF SCIENCE (Non-Medical) **Semester II**								
Course Code		**Course Name**	**Course Type**	**Total**	**Ext.**		**CA**	**Examination time (in Hours)**
					L	**P**		
BSNL-2421 BSNL-2031 BSNL-2431		Punjabi (Compulsory) [1]Basic Punjabi [2]Punjab History & Culture	C	50	40	-	10	3
BSNL-2212		English (Compulsory)	C	50	40	-	10	3
BSNM-2333	(I)	**Mathematics** (Calculus and Differential equations)	C	100	80 (40+40)	-	20	3+3
	(II)	**Mathematics** (Calculus)						
BSNM-2084	(I)	**Chemistry** (Inorganic Chemistry)-I	C	100	60 (30+30)	20	20	3+3+3
	(II)	**Chemistry** (Physical Chemistry)-II						
	(P)	**Chemistry** (Practical)						
BSNM-2395	(I)	**Physics** (Relativity And Electromagnetism)	C	100	60 (30+30)	20	20	3+3+3
	(II)	**Physics** (Vibration And Waves)						
	(P)	**Physics** (Practical)						
AECD-2161		*Drug Abuse: Problem Management and Prevention (Compulsory)	AC	50	40	-	10	3
SECM-2502		*Moral Education Programme	AC	25	20	-	5	2
Total				400				

Kanya Maha Vidyalaya, Jalandhar (Autonomous)
CURRICULUM AND SCHEME OF EXAMINATIONS OF THREE YEAR DEGREE PROGRAM
BACHELOR OF SCIENCE (Non-Medical)
Session-2021-2022

Bachelor of Science(Non-Medical) **Semester III**								
Course Code		**Course Name**	**Course Type**	**Total**	**Ext.**		**CA**	**Examination time (in Hours)**
					L	**P**		
BSNL-3421 BSNL-3031 BSNL-3431		Punjabi (Compulsory) [1]Basic Punjabi [2]Punjab History & Culture	C	50	40	-	10	3
BSNl-3212		English (Compulsory)	C	50	40	-	10	3
BSNM-3333	(I)	**Mathematics** (Analysis)	C	100	80 (40+40)	-	20	3+3
	(II)	**Mathematics** (Analytical Geometry)						
BSNM-3084	(I)	**Chemistry** (organic Chemistry)	C	100	60 (30+30)	20	20	3+3+3½
	(II)	**Chemistry** (Physical Chemistry)						
	(P)	**Chemistry** (Practical)						
BSNM-3395	(I)	**Physics** (Statistical Physics & Thermodynamics)	C	100	60 (30+30)	20	20	3+3+3
	(II)	**Physics** (Optics)						
	(P)	**Physics** (Practical)						
AECE-3221		*EVS (Compulsory)	AC	50	40	-	10	3
SECP-3512/SECG-3531		* Personality Development Programme/ Gender Sensitization	AC	25	Grade only			1
Total				400				

Kanya Maha Vidyalaya, Jalandhar (Autonomous)

CURRICULUM AND SCHEME OF EXAMINATIONS OF THREE YEAR DEGREE PROGRAM

BACHELOR OF SCIENCE (Non-Medical)

Session-2021-2022

Bachelor of Science(Non-Medical) **Semester IV**								
Course Code		**Course Name**	**Course Type**	**Total**	**Ext.**		**CA**	**Examination time (in Hours)**
					L	**P**		
BSNL-4421 BSNL-4031 BSNL-4431		Punjabi (Compulsory) [1]Basic Punjabi [2]Punjab History & Culture	C	50	40	-	10	3
BSNL -4212		English (Compulsory)	C	50	40	-	10	3
BSNM-4333	(I)	**Mathematics** (Statics and Vector Calculus)	C	100	80 (40+40)	-	20	3+3
	(II)	**Mathematics (**Solid Geometry)						
BSNM-4084	(I)	**Chemistry** (Inorganic Chemistry)-I	C	100	60 (30+30)	20	20	3+3+3
	(II)	**Chemistry** (Organic Chemistry)-II						
	(P)	**Chemistry** (Practical)						
BSNM-4395	(I)	**Physics** (Quantum Mechanics)	C	100	60 (30+30)	20	20	3+3+3
	(II)	**Physics** (Atomic Spectra & Lasers)						
	(P)	**Physics** (Practical)						
SECS-4522		* Social Outreach	AC	Grade only				10 hours per sem
Total				400				

Kanya Maha Vidyalaya, Jalandhar (Autonomous)

CURRICULUM AND SCHEME OF EXAMINATIONS OF THREE YEAR DEGREE PROGRAM

BACHELOR OF SCIENCE (Non-Medical)

Session-2021-2022

Bachelor of Science(Non-Medical) **Semester V**								
Course Code		**Course Name**	**Course Type**	**Total**	**Ext.**		**CA**	**Examination time (in Hours)**
					L	**P**		
BSNL-5421 BSNL-5031 BSNL-5431		Punjabi (Compulsory) [1]Basic Punjabi [2]Punjab History & Culture (From 1849-1947 A.D.)	C	50	40	-	10	3
BSML-5212		English (Compulsory)	C	50	40	-	10	3
BSNM-5333	(I)	**Mathematics** (Dynamics)	C	100	80 (40+40)	-	20	3+3
	(II)	**Mathematics** (Number Theory)						
BSNM-5084	(I)	**Chemistry** (Inorganic Chemistry)	C	100	60 (30+30)	20	20	3+3+ 3½
	(II)	**Chemistry** (Physical Chemistry)						
	(P)	**Chemistry** (Practical)						
BSNM-5395	(I)	**Physics** (Condensed Matter Physics)	C	100	60 (30+30)	20	20	3+3+3
	(II)	**Physics** (Electronics)						
	(P)	**Physics** (Practical)						
SECI-5541		**Job Readiness/Innovation, Entrepreneurship and Venture Development**	AC	2 credits and 30 hours				Grade only
Total				400				

Kanya Maha Vidyalaya, Jalandhar (Autonomous)

CURRICULUM AND SCHEME OF EXAMINATIONS OF THREE YEAR DEGREE PROGRAM

BACHELOR OF SCIENCE (Non-Medical)

Session-2021-2022

Bachelor of Science(Non-Medical)

Semester VI

Course Code		Course Name	Course Type	Total	Ext.		CA	Examination time (in Hours)
					L	P		
BSNL-6421 BSNL-6031 BSNL-6431		Punjabi (Compulsory) [1]Basic Punjabi [2]Punjab History & Culture	C	50	40	-	10	3
BSNL-6212		English (Compulsory)	C	50	40	-	10	3
BSNM-6333	(I)	**Mathematics** (Linear Algebra)	C	100	80 (40+40)	-	20	3+3
	(II)	**Mathematics (**Numerical Analysis)						
BSNM-6084	(I)	**Chemistry** (Organic Chemistry)-I	C	100	60 (30+30)	20	20	3+3+ 3½
	(II)	**Chemistry** (Physical Chemistry)-II						
	(P)	**Chemistry** (Practical)						
BSNM-6395	(I)	**Physics**(Nuclear Physics)	C	100	60 (30+30)	20	20	3+3+3
	(II)	**Physics** (Radiation and Particle Physics)						
	(P)	**Physics** (Practical)						
Total				400				

C-Compulsory

E-Elective

AC- Audit Course

AECC- Ability Enhancement Compulsory Course

VBCC- Value Based Compulsory Course

[1] Special paper in lieu of Punjabi (Compulsory).

[2] Special paper in lieu of Punjabi (Compulsory) for those students who are not domicile of Punjab.

***Marks of these papers will not be added in total marks and only grades will be provided**

Programme Specific Outcomes

BACHELOR OF SCIENCE (Non-Medical) (Phy. Chem. Maths.)

Upon successful completion of this course, students will be able to:

PSO1. demonstrate proficiency in mathematics and the mathematical concepts needed for a proper understanding of physics and chemistry.

PSO2: solve complex mathematical problems by critical understanding, analysis and synthesis.Student will also be able to provide a systematic understanding of the concepts and theories of mathematics and there application in the real world – to an advanced level, and enhance career prospects in a huge array of fields or suitable to succeed at an entry-level position in mathematics post graduate programme.

PSO3:demonstrate knowledge of mechanics, electromagnetism, quantum mechanics, optics & lasers, waves & vibrations, statistical physics, condensed matter physics, electronics, nuclear & particle physics and be able to apply this knowledge to analyse a variety of physical phenomena.

PSO4: demonstrate knowledge of organic, inorganic and physical chemistry and apply this knowledge toanalyse a variety of chemical phenomena and will be able to interpret and analyse quantitative data.

PSO5: understand theoretical concepts of instruments that are commonly used in most physics and chemistry fields as well as interpret and use data generated in instrumental physical and chemical analyses.

PSO6: show that they have learned laboratory skills, enabling them to take measurements in a physics laboratory and analyse the measurements to draw valid conclusions. They will also be able to employ critical thinking and scientific inquiry in the performance, design, interpretation and documentation of laboratory experiments, at a level suitable to succeed at an entry-level position in industry or a physics/chemistry postgraduate program.

PSO7: capable of oral and written scientific communication i.e. able to communicate effectively by oral, written, computing and graphical means.

Bachelor of Arts/ Bachelor of Science (Economics, Non-Medical, Computer Science) Semester–I

Session: 2021-22
Course Title: Mathematics (Algebra)

Course Code: BARM/ BECM/ BCSM/ BSNM-1333(I)

Course Outcomes

After passing this course, the students will be able to:

CO 1: Distinguish between solution of cubic equations and Bi-quadratic equations.

CO 2: Classify real quadratic form in variables, definite, semi- definite and indefinite real quadratic form.

CO 3: Understand the concept of matrix congruence of skew symmetric matrices and its reduction in real field.

CO 4: Solve system of linear equations and obtain Eigen values, Eigen vectors, minimal and characteristic equation of a matrix and to apply it in advanced dynamics and electric current.

CO 5: To find the relations between the roots and coefficients of general polynomial equation in one variable.

Bachelor of Arts/ Bachelor of Science (Economics, Non-Medical, Computer Science) Semester–I

Session: 2021-22
Course Title: Mathematics (Algebra)

Course Code: BARM/ BECM/ BCSM/ BSNM-1333(I)

Examination Time: 3 hrs. Max.Marks:50

Theory:40

CA:10

Instructions for the Paper Setter: Eight questions of equal marks(8 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.

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Unit–I

Linear independence of row and column vectors. Row rank, Column rank of a matrix, Equivalence of column and row ranks, Nullity of matrix, Applications of matrices to a system of linear (both homogeneous and non–homogeneous) equations. Theorems on consistency of a system of linear equations.

Unit-II

Eigen values, Eigen vectors, minimal and the characteristic equation of a matrix. Cayley Hamilton theorem and its use in finding inverse of a matrix.Quadratic Forms, quadratic form as a product of matrices.The set of quadratic forms over a field.

Unit–III

Congruence of quadratic forms and matrices.Congruent transformations of matrices.Elementary congruent transformations.Congruent reduction of a symmetric matrix.Matrix Congruence of skew–symmetric matrices.Reduction in the real field.Classification of real quadratic forms in variables. Definite, semi–definite and indefinite real quadratic forms. Characteristic properties of definite, semi–definite and indefinite forms.

Unit-IV

Relations between the roots and coefficients of general polynomial equation in one variable. Transformation of equations and symmetric function of roots, Descarte's rule of signs, Newton's Method of divisors, Solution of cubic equations by Cardon method, Solution of biquadratic equations by Descarte's and Ferrari's Methods.

Text Book:

ChandrikaParsad: Text book on Algebra and Theory of Equations, PothishalaPvt. Ltd., Allahabad.(Relevant Portions)

Reference Books:

1.K.B. Dutta: Matrix and Linear Algebra, Prentice Hall of India Pvt. Ltd., New Delhi (2002).

2.Shanti Narayan and P.K. Mittal : Text Book of Matrices.

3.S. Hall and S.R. Knight: Higher Algebra, H.M. Publications, 1994.

Bachelor of Arts/ Bachelor of Science (Economics, Non-Medical, Computer Science) Semester–I

Session: 2021-22
Course Title: Mathematics (Calculus and Trigonometry)

Course Code: BARM/ BECM/ BCSM/ BSNM-1333(II)

Course Outcomes

After passing this course, the students will be able to:

CO 1: Understand real number system, lub&glb of set of real numbers, limit of a function, basic properties of limit & to apply it in real world problem.

CO 2: Analyse continuous and discontinuous function, Apply concept of continuity in uniform continuity.

CO 3: Manage to solve problems related to successive differentiation, Leibnitz theorem, Taylor's &Maclaurin's theorem with various forms of remainders and to use these expansion to compute values of Sine, Cosine, tangent or log function.

CO 4: Understand the concept of De Moivre's theorem & its applications. Identify circular, hyperbolic function and their inverses and use these function to describe the shape of the curve formed by high voltage line suspended between two towers.

CO 5: Demonstrate exponential and logarithmic function of complex numbers, and to solve Gregory's series and summation of series.

Bachelor of Arts/ Bachelor of Science (Economics, Non-Medical, Computer Science) Semester–I

Session: 2021-22
Course Title: Mathematics (Calculus and Trigonometry)

Course Code: BARM/ BECM/ BCSM/BSNM-1333(II)

Examination Time: 3 hrs. Max.Marks:50

Theory :40

CA:10

Instructions for the Paper Setter: Eight questions of equal marks(8 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

Real number system and its properties, lub, glb of sets of real numbers, limit of a function, Basic properties of limits, Continuous functions and classification of discontinuities, Uniform continuities.

Unit-II

Differentiation of hyperbolic functions, Successive differentiation, Leibnitz theorem, Taylor's and Maclaurin's theorem with various forms of remainders, Indeterminate forms.

Unit-III

De–Moivre's Theorem and its applications, circular and hyperbolic functions and their inverses.

Unit-IV

Exponential and Logarithmic function of a complex numbers, Expansion of trigonometric functions, Gregory's series, Summation of series.

Text Books:

1.GeorgeB.Thomas and Ross L.Finney: Calculus and Analytic Geometry, 9thedition, Addison Wesley,1998(Relevant portions related to Unit-I &II)

2..S.L.Loney: Plane trigonometry part -II(relevant portions related to Unit-III & IV) Cambridge university press.

Reference Books:

1.ErwinKreyszig: Advanced Engineering Mathematics, John Wiley and Sons, 1999.

2.N. Piskunov: Differential and Integral Calculus, Peace Publishers, Moscow.

3.Gorakh Prasad: Differential Calculus, PothishalaPvt. Ltd., Allahabad.

Bachelor of Science (Medical and Non-Medical)SEMESTER–I

(Session: 2021-22)

COURSE CODE: BSMM/BSNM-1084(I)

INORGANIC CHEMISTRY

(THEORY)

Course outcome:
Students will be able to
CO1:Predict electronic properties of atoms using current models and theories in chemistry
CO2:explains de-Broglie's dual behaviour of matter and Heisenberg's uncertainty principle and solve numerical problems
CO3:explain the significance of quantum numbers
CO4:sketch the probability density curves , boundary surface diagrams and shapes of s, p ,d and f orbitals and write the electronic configuration of atoms
CO5:identify the periodic trends in physical and chemical properties of elements.
CO6:describe VSEPR theory and predicts the geometry of simple molecules
CO7:explain the valence bond approach for the formation of covalent bonds and the different types of hybridization involving s, p and d orbitals of simple covalent molecules
CO8:describe the molecular orbital theory of homonuclear diatomic molecules
CO9:explain the structures simple compounds.
CO10:differentiate the types of van der waals' forces such as London forces, dipole - dipole interactions and dipole - induced dipole interactions and explain the concept of hydrogen bonding
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Bachelor of Science (Medical and Non Medical)SEMESTER–I

(Session: 2021-22)

COURSE CODE: BSMM/BSNM-1084(I)

INORGANIC CHEMISTRY

(THEORY)

Time: 3 Hrs. Max.Marks:30

Instructions for the Paper Setter

Eight questions of equal marks (six 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

I. Atomic Structure

Idea of de Broglie matter waves, Heisenberg uncertainty principle, atomic orbitals, Schrodinger wave equation, significance of ψ^1 and ψ 2, quantum numbers, radial and angular wave functions and probability distribution curves, shapes of s,p,d orbitals. Aufbau and Pauli exclusion principles, Hund's multiplicity rule. Electronic configurations of the elements and ions.

UNIT–II

II. Periodic Properties

Position of elements in the periodic table; effective nuclear charge and its calculations. Atomic and ionic radii, ionization energy, electron affinity and electronegativity –definition, methods of determination or evaluation, trends in periodic table and applications in predicting and explaining the chemical behaviour.

UNIT–III

III. Chemical Bonding

Covalent Bond –Valence bond theory and its limitations, directional characteristics of covalent bond, various types of hybridizationand shapes of simple inorganic molecules and ions. BeF_2 , BF_3,CH_4, PF_5, SF_6, IF_7, $SnCI_2$, XeF_4, BF_4, $SnC1_6$. Valence shellelectron pair repulsion (VSEPR) theory to NH_3, H_3O+,

SF_4,CIF_3, ICl_2 and H_2O. MO theory, homonuclear (elements and ions of 1st and 2nd row), and heteronuclear (BO, CN^-, CO, NO^+, CO^+, CN),

diatomic molecules, multicenter bonding in electron deficient molecule (Boranes). Percentage ionic character from dipole moment and electronegativity difference

UNIT–IV

IV. Ionic Solids

Concept of close packing, Ionic structures, (NaCI type, Zinc blende, Wurtzite, CaF_2 and antifluorite, radius ratio rule and coordination number, limitation of radius ratio rule, lattice defects, semiconductors, lattice energy and Born–Haber cycle, solvation energy and solubility of ionic solids, polarizing power and polarisability of ions, Fajan's rule. Metallic bond– free electron, valence bond and band theories.

Weak Interactions –Hydrogen bonding, Vander Waals forces

Books Suggested:

1. Cotton, F.A., Wilkinson, G., Gaus, P.L., Basic Inorganic Chemistry; 3rd edition, Pubs: John Wiley Sons. 1995.

2. Lee, J.D., Concise Inorganic Chemistry; 4th edition, Pubs: Chapman Hall Ltd., 1991.

3. Shriver, D.E., Alkins, P.W., Langford, C.H., Inorganic Chemistry; 4th edition, Oxford Publisher: Oxford University Press, 2006.

4. Douglas, B. McDamiel, D., Alexander, J., Concepts and Models of Inorganic Chemistry; 3rd edition, Pubs: John Wiley and Sons Inc., 1994.

5. Miessler, G.L., Larr, D.A., Inorganic Chemistry; 3rd edition, Pubs: Pearson Education Inc., 2004.

6. Jolly, W.L., Modern Inorganic Chemistry; 2nd edition, Pubs: McGraw-Hill Publishing Company Limited, 1991.

7. Purcell, K.F., Kotz, J.C., Inorganic Chemistry; Pubs: W.B. Saunders Company, 1977.

8. Puri, B.R., Sharma, L.R., Kalia, K.C., Principles of Inorganic Chemistry; 30th edition, Pubs: Milestones Publisher, 2006-07.

9. University General Chemistry, C.N.R. Rao, Macmillan.

10. Inorganic Chemistry, W.W. Porterfield Addison-Wesley.

11. Inorganic Chemistry, A.G. Sharpe, ELBS.

B.Sc (Med and Non.Medical) SEMESTER–I

(Session: 2021-22)

COURSE CODE: BSMM/BSNM-1084(II)

ORGANIC CHEMISTRY

(THEORY)

Course outcome:
Students will be able to
CO1: explain the bonding between different organic compounds
CO2: explain the various reaction mechanisms and different electron displacement effects
CO3: explain the various methods of formation and chemical reactions of alkanes, alkenes and alkynes
CO4: compare the reactivities of various alkyl and aryl halide
CO5: differentiate between aromatic, anti-aromatic and non aromatic compounds
CO6: compare the stability of various cycloalkanes
CO7: explain the effect of various substituents on the reactivity of aromatic compounds

B.Sc (Med and Non.Medical) SEMESTER–I

(Session: 2021-22)

COURSE CODE: BSMM/BSNM-1084(II)

ORGANIC CHEMISTRY

(THEORY)

Time: 3 Hrs. Max.Marks: 30

Instructions for the Paper Setter

Eight questions of equal marks(six 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.

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UNIT–I

I. Structure and Bonding

Hybridization, bond lengths and bond angles, bond energy, localized and delocalized chemical bond, Vander Waals interactions, resonance, hyperconjugation, aromticity hydrogen bonding and Inductive and electrometric effects.

II. Mechanism of Organic Reactions

Curved arrow notation, drawing electron movements with arrows, half–headed and double–headed arrows, homolytic and heterolytic bond breaking. Types of reagents – electrophiles and nucleophiles. Types of organic reactions. Energy considerations.

Reactive intermediates –Carbocations, carbanions, free radicals, carbenes, arenes and nitrenes (with examples). Assigning formal charges on intermediates and other ionic species.

UNIT-II

III. Alkanes

Isomerism in alkanes, sources, methods of formation (with special reference to Wurtz reaction, Kolbe reaction, Corey–House reaction and decarboxylation of carboxylic acids), physical properties and chemical reactions of alkanes. Mechanism of free radical halogenation of alkanes: orientation, reactivity and selectivity.

IV. Alkenes and Alkynes

Nomenclature of alkenes, methods of formation, mechanisms of dehydration of alcohols and dehydrohalogenation of alkyl halides, regioselectivity in alcohol dehydration. The Saytzeff rule, Hofmann elimination, physical properties and relative stabilities of alkenes. Chemical reactions of alkenes-mechanisms involved in hydrogenation, electrophilic and free radical additions, Markownikoff's rule, hydroboration-oxidation, oxymercuration reduction. Epoxidation, ozonolysis, hydration, hydroxylation and oxidation with $KMnO_4$.

Substitution at the allylic and vinylic positions of alkenes.

Nomenclature, structure and bonding in alkynes. Methods of formation. Chemical reactions of alkynes, acidity of alkynes. Mechanism of electrophilic and nucleophilic addition reactions, hydroboration-oxidation, metal-ammonia reductions, oxidation and polymerization.

UNIT–III

V. Alkyl and Aryl Halides

Nomenclature and classes of alkyl halides, chemical reactions. Mechanisms of nucleophilic substitution reaction of alkyl halides, SN2 and SN1 reactions with energy profile diagrams. Nuclear and side chain reactions. The addition-elimination and the elimination-addition mechanisms of nucleophilic aromatic substitution reactions. Relative reactivities of alkyl halides vs allyl, vinyl and aryl halides.

VI. Cycloalkanes:

Baeyer's strain theory and its limitations. Ring strain in small rings (cyclopropane and cyclobutane), theory of strainless rings. The case of cyclopropane ring : banana bonds.

UNIT-IV

VII. Arenes and Aromaticity

Nomenclature of benzene derivatives. The aryl group. Aromatic nucleus and side chain. Structure of benzene: Molecular formula and Kekule structure. Stability and carbon carbon bond lengths of benzene, resonance structure, MO picture.

Aromaticity : the Huckel's rule, aromatic ions.

Aromatic electrophilic substitution–general pattern of the mechanism, role of σ and π complexes. Mechanism of nitration, halogenation, sulphonation, mercuration and Friedel Crafts reaction. Energy profile diagrams. Activating and deactivating substituents, orientation and ortho/para ratio. Side chain reactions of benzene derivatives. Methods of formation and chemical reactions of alkylbenzenes.

Books suggested:

1. Morrison, R.T., Boyd, R.N., Organic Chemistry; 6th edition, Pubs: Prentice-Hall, 1992.

2. Solomons, T.W., Fryhle, C.B., Organic Chemistry; 9th edition, Pubs: Wiley India, 2007.

3. Wade Jr., L.G., Singh, M.S., Organic Chemistry; 6th edition, Pubs: Pearson education, 2008.

4. Mukherji, S.M., Singh, S.P., Kapoor, R.P., Organic Chemistry; Pubs: New Age International, 1985.

5. Carey, F.A., Sundberg, R.J., Advanced Organic Chemistry Part B: Reactions and Synthesis.

6. Fundamentals of Organic Chemistry, Solomons, John Wiley.

7. Introduction to Organic Chemistry, Sireitwieser, Heathcock and Kosover, Macmilan.

Bachelor of Science (Medical and Non-Medical) SEMESTER–I

(Session: 2021-22)

COURSE CODE: BSMM/BSNM-1084(P)

CHEMISTRY PRACTICAL

Course outcome:

Students will be able to

CO1: separate and identify the various ions present in the mixture

CO2: accurately note down the melting and boiling point of organic compounds

Bachelor of Science (Medical and Non-Medical) SEMESTER–I

(Session: 2021-22)

COURSE CODE: BSMM/BSNM-1084(P)

CHEMISTRY PRACTICAL

Time: 3½ Hrs. Max.Marks: 20

Instruction for practical examiner:Question paper is to be set on the spot jointly by the Internal and External Examiners. Two copies of the same should be submitted for the record to COE Office, Kanya Maha Vidyalaya, Jalandhar.

Inorganic Chemistry: Semi Micro analysis. Cation analysis, Separation and identification of ions from groups I, II, III, IV, V, and VI. Anionic analysis. Four ions with no interference.

Organic Chemistry Laboratory Techniques

Determination of Melting Point

Naphthalene 80–82^{o}C
Benzoic acid 121.5–122^{0}C
Urea 132.5–133^{o}C
Succinic Acid 184.5–185^{o}C
P–dichlorobenzene 52^{o}C
Cinnamic acid 132.5–133^{o}C
Salicylic acid 157.5–158^{o}C
Acetanilide 113.5–114^{o}C
m–dinitro benzene 90^{o}C
Aspirin 135^{o}C

Determination of Boiling Point

Ethanol 78^{o}C
Benzene–80^{o}C
Cyclohexane 81.4^{o}C,
Toluene 110°C

Practical Examination

1) Inorganic Mixture	12
2) Melting Point/Boiling point of organic substance	03
3) Viva–Voce	03
4) Note Book	02

Books suggested:

1. Vogel's Qualitative Inorganic Analysis, revised, Svehla, Orient Longman.
2. Experimental Inorganic Chemistry, W.G. Palmer, Cambridge. Standard Methods of Chemical. Analysis, W.W. Scott: The Technical Press.
3. Laboratory Manual in Organic Chemistry, R.K. Bansal, Wiley Eastern.
4. Vogel's Textbook of Practical Organic Chemistry, B.S. Furniss, A.J. Hannaford, V. Rogers, P.W.G. Smith and A.R. Tatchell, ELBS.
5. Experiments in General Chemistry, C.N.R. Rao and U.C. Aggarwal, East-West Press**.**

SEMESTER–I
(2021-22)
PHYSICS
MECHANICS
(THEORY)
Course code: BSNM-1395 (I) for B.Sc. (Non Medical)
BCSM-1395 (I) for B.Sc. (Computer Science)

Course Outcomes: Mechanics -Paper (A)

After passing this course, students will be able to:

CO1: Understand the various coordinate systems and its applications. Students will be able to know the conservations laws and the symmetries of space & time.

CO2: Know the fundamental forces of nature, concept of centre mass, central forces and the motion of particle under central force and to determine the turning points of orbit.They will be able to understand the planetary motion by solving differential equation of orbits and studying Kepler's laws.

CO3: They will understand the origin of fictitious forces and their consequences on acceleration due to gravity, motion of a particle on earth, and Foucault's pendulum.

CO4: They will understand the elastic scattering in lab and centre of mass systems. They will learn the rotational motion of a body in general by studying the Euler's equations and Moment of inertia tensor.

B.Sc. (Semester System) (12+3 System of Education) (Semester–I) (Session 2021-22)

(Faculty of Sciences)
SEMESTER–I

PHYSICS

MECHANICS
(THEORY)
Course code: BSNM-1395 (I) for B.Sc. (Non Medical)
BCSM-1395 (I) for B.Sc. (Computer Science)

Time: 3 Hours Marks: 30

Pass Marks: 11

Instructions for the Paper Setters:
Eight questions of equal marks 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. Each question carries 6 marks.

Note: Students can use Non-Scientific calculators or logarithmic tables.

UNIT–I

Cartesian and spherical polar co–ordinate systems, area, volume, velocity and acceleration in these systems, Solid angle, Relationship of conservation laws and symmetries of space and time.

UNIT–II

Various forces in Nature (Brief introduction) centre of mass, equivalent one body problem, central forces, equation of motion under central force, equation of orbit and turning points. Kepler Laws. Concept of Ether and Michelson–Morley experiment.

UNIT–III

Inertial frame of reference. Galilean transformation and Invariance. Non Inertial frames, Coriolis force and its applications. Variation of acceleration due to gravity with latitude. Foucault pendulum.

UNIT–IV

Elastic collision in Lab and C.M. system, velocities, angles and energies, cross section of elastic scattering, Rutherford scattering. Rigid Body motion; Rotational motion, principal moments and Axes. Euler's equations, precession and elementary gyroscope.

Books Suggested:

1. Mechanics-Berkeley Physics Course, by C. Kittel, W. D. Knight, M. A. Ruderman, C. A. Helmholtz and R. J. Moyer-Tata Mc Graw Hill Publishing Company Ltd.,New Delhi. Vol-I (second edition)
2. Fundamentals of Physics by D. Halliday, R. Resnick and J. Walker (sixth edition)-Wiley India Pvt. Ltd., New Delhi, 2004.
3. Analytical Mechanics by S. K. Gupta, Modern Publishers.

SEMESTER–I
PHYSICS
ELECTRICITY AND MAGNETISM
(THEORY)

Course code: BSNM-1395 (II) for B.Sc. (Non Medical)
BCSM-1395 (II) for B.Sc. (Computer Science)

Course Outcomes: Electricity and magnetism

After passing this course the students will be able to:

CO1: understand the vector calculus and vector algebra and its applications in electricity and magnetism. The students will be able to solve the electrostatic problems with the help of Gauss law and Coulomb's law.

CO2: understand the applications of scalar potential for the calculation of electric field and electric potential due to an arbitrary charge distribution.

CO3: They will be able to find the electric potential and electric field of various charge distributions with the help of method of images. Students will understand the conduction of electric current in conductors by studying Ohm's law and equation of continuity.

CO4: They will be able to find the relationship between electric field from two different inertial frames of reference. They will be learn the origin of magnetism and properties of various kinds of magnetic materials.

SEMESTER–I
PHYSICS
ELECTRICITY AND MAGNETISM
(THEORY)
Course code: BSNM-1395 (II) for B.Sc. (Non Medical) Session 2021-22
BCSM-1395 (II) for B.Sc. (Computer Science)

Time: 3 Hours Marks: 30

Pass Marks: 11

Instructions for the Paper Setters:
Eight questions of equal marks 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. Each question carries 6 marks.

Note: Students can use Non-Scientific calculators or logarithmic tables.

UNIT–I

Basic ideas of Vector Calculus Gradient, Divergence, curl and their physical significance. Laplacian in rectangular, cylindrical and spherical coordinates. Coulomb's Law for point charges
And continuous distribution of charges. Electric field due to dipole, line charge and sheet of charge. Electric flux, Gauss's Law and its applications. Gauss's divergence theorem and differential form of Gauss's Law. Green's theorem.

UNIT–II

Work and potential difference. Potential difference as line integral of field. Electric potential due
to a point charge a group of point charges, dipole and quadruple moments, long uniformly charged wire, charged disc. Stoke's theorem and its applications in Electrostatic field, curl E=0.Electric fields as gradient of scalar potential. Calculation of E due to a point charge and dipole from potential. Potential due to arbitrary charge distribution and multipole moments.

UNIT–III

Poisson and Laplace's equation and their solutions in Cartesian and spherical coordinates. Concept of electrical images. Calculation of electric potential and field due to a point charge placed near an infinitely conducting sheet. Current and current density, equation of continuity. Microscopic form of Ohm's Law ($J=\sigma E$) and conductivity, Failure of Ohm's Law. Invariance of charge.

UNIT–IV

E in different frames of reference. Field of a point charge moving with constant velocity. Interaction between moving charges and force between parallel currents. Behaviour of various substances in magnetic field. Definition of M and H and their relation to free and bound currents.
Permeability and susceptibility and their interrelationship. Orbital motion of electrons and Diamagnetism.

Books Suggested:

1. Fundamentals of Electricity and Magnetism by Arthur F. Kipp.
2. Electricity and Magnetism, Berkeley Physics Course, Vol. II by E.M. Purcell.
3. Introduction to Classical Electrodynamics by David Griffith.
4. EM Waves and Radiating System by Edward C. Jordan and K.G. Balmain.
5. Fields and Waves Electromagnetic by David K. Cheng.

SEMESTER–I
PHYSICS
PHYSICS PRACTICAL
Course code: BSNM-1395 (P) for B.Sc. (Non Medical)
BCSM-1395 (P) for B.Sc. (Computer Science)

Course Outcomes : Physics Lab Sem I
CO1: Students will be able to find the value of acceleration due to gravity using pendulums.
CO2 : It will give understanding of collisions In 1-Dimension.
CO3: It helps to study the moment of inertia of a body & on what factors its depends.

SEMESTER–I
PHYSICS PRACTICAL
Course code: BSNM-1395 (P) for B.Sc. (Non Medical)
BCSM-1395 (P) for B.Sc. (Computer Science)
Session 2021-22

Instructions to Practical Examiner
Question paper is to be set on the spot jointly by the external and internal examiners. Two copies of the same to be submitted for the record to COE office, Kanya Maha Vidyalaya, Jalandhar

General Guidelines for Practical Examination
I. The distribution of marks is as follows: **Marks: 20**
i) One experiment **7 Marks**
ii) Brief Theory **3 Marks**
iii) Viva–Voce **5 Marks**
iv) Record (Practical file) **5 Marks**
II. There will be one sessions of 3 hours duration. The paper will have one session.
Paper will consist of 8 experiments out of which an examinee will mark 6 experiments and one of these is to be allotted by the external examiner.
III. Number of candidates in a group for practical examination should not exceed 12.
IV. In a single group no experiment is to be allotted to more than three examinees in any group.

LIST OF EXPERIMENTS
1. To study the dependence of moment of inertia on distribution of mass (by noting time periods of oscillations using objects of various geometrical shapes but of same mass).
2. To establish relationship between torque and angular acceleration using fly wheel.
3. To find the moment of inertia of a flywheel.
4. Study of bending of beams and determination of Young's modulus.
5. Determination of Poisson's ratio for rubber.
6. To determine energy transfer, coefficient of restitution and verify laws of conservation of linear momentum and kinetic energy in elastic collisions using one dimensional collisions of hanging spheres.
7. To verify the laws of vibrating string by Melde's experiment.
8. Measure time period as a function of distance of centre of suspension (oscillation) from centre of mass, plot relevant graphs, determine radius of gyration and acceleration due to gravity.
9. Find the value of 'g' by Kater's pendulum.
10. Measure time period of oscillation of a Maxwell needle and determine modulus of rigidity of the material of a given wire.
11. To measure logarithmic decrement, coefficient of damping, relaxation time, and quality factor of a damped simple pendulum.

Bachelor of Arts/ Bachelor of Science (Economics, Non-Medical, Computer Science)

Semester–II

Session: 2021-22
Course Title: Mathematics (Calculus and Differential Equations)

Course Code: BARM/BECM/ BCSM/BSNM-2333(I)

Course Outcomes

After passing this course, the students will be able to:

CO 1: Demonstrate Asymptotes, points of inflexion, multiple points on a curve & also to differentiate between concavity and convexity & hence tracing of curve.

CO 2: Understand the concept of linear differential equation with constant and variable coefficients & also the exact differential equations & to apply in a wide variety of disciplines like Bio, Eco, Physics& Engineering.

CO 3: Demonstrate the geometrical meaning of a differential equation & the orthogonal trajectories.

CO 4: Manage to solve the problem related to series solution of differential equations like Bessel and Legendre equation by Power series method.

CO 5: Apply reduction formula on different functions & to develop the concept of variation of parameter.

Bachelor of Arts/ Bachelor of Science (Economics, Non-Medical, Computer Science)

Semester–II

Session: 2021-22
Course Title: Mathematics (Calculus and Differential Equations)

Course Code: BARM/BECM/ BCSM/BSNM-2333(I)

Examination Time: 3 Hours

Max.Marks:50

Theory :40

CA:10

Instructions for the Paper Setter: Eight questions of equal marks(8 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

Asymptotes, Tests for concavity and convexity, Points of inflexion, Multiple Points, Curvature, Tracing of Curves (Cartesian and Parametric coordinates only).

Unit-II

Integration of hyperbolic functions.Reductionformulae.Definiteintegrals.Fundamental theorem of integral calculus.Quadrature, rectification.

Unit– III

Exact differential equations. First order and higher degree equations solvable for x,y,p. Clairaut's form and singular solutions. Geometrical meaning of a differential equation.Orthogonal trajectories.

Unit-IV

Linear differential equations with constant and variable coefficients.Variation of Parameters method, reduction method, series solutions of differential equations. Power series method, Bessel and Legendre equations (only series solution).

Text Book:

Om P.Chug, Parmanand Gupta, R.S.Dahiya: Topics in Mathematics: Calculus and Differential Equations, Laxmi Publications Private Ltd.

Reference Books:

1. D.A. Murray: Introductory Course in Differential Equations. Orient Longman (India), 1967.

2. G.F. Simmons: Differential Equations, Tata McGraw Hill, 1972.

3. Gorakh Prasad: Integral Calculus, PothishalaPvt. Ltd., Allahabad.

4. Erwin Kreyszig: Advanced Engineering Mathematics, John Wiley and Sons, 1999. 52

Bachelor of Arts/ Bachelor of Science (Economics, Non-Medical, Computer Science)

Semester–II

Session: 2021-22
Course Title:Mathematics (Calculus)

Course Code: BARM/BECM/ BCSM/BSNM-2333(II)

Course Outcomes

After passing this course, the students will be able to:

CO 1: Understand the concept of Double and Triple integrals, & application to evaluation of areas, volumes, surfaces of solid of revolution and to apply to find out area and volume of plane and solid figure.

CO 2: Differentiate between limit and continuity of function of two variables and apply this concept in partial derivatives & differentiability of real valued function of two variables.

CO 3: Manage to solve problems related to Maxima, Minima & Saddle points of functions of two variables.

CO 4: Classify Envelopes &Evolutes, Application of inverse & implicit function theorems.

Bachelor of Arts/ Bachelor of Science (Economics, Non-Medical, Computer Science)

Semester–II

Session: 2021-22
Course Title:Mathematics (Calculus)

Course Code: BARM/BECM/ BCSM/BSNM-2333(II)

Examination Time: 3 Hours

Max.Marks:50

Theory :40

CA:10

Instructions for the Paper Setter: Eight questions of equal marks(8 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

Limit and Continuity of functions of two variables, Partial differentiation, Change of variables, Partial derivatives and differentiability of real–valued functions of two variables, Schwartz's and Young's Theorem, Statements of Inverse and implicit function theorems and applications.

Unit-II

Euler's theorem on homogeneous functions, Taylor's theorem for functions of two variables, Jacobians, Envelopes.Evolutes, Maxima, Minima and saddle points of functions of two variables.

Unit-III

Lagrange's undetermined multiplier method, Double and Triple Integrals, Change of variables, Change of order of integration in double integrals.

Unit-IV

Application to evaluation of area, volume, surface of solids of revolutions.

Text Book:

George B. Thomas and Ross L. Finney: Calculus and Analytic Geometry, 9th Edition, Addison Wesley, 1998

Reference Books:

1. Narayan, S. and P.K. Mittal: Integral Calculus. Sultan Chand & Sons.

2. Kreyszig, E.: Advanced Engineering Mathematics.

3. Narayan S. and P.K. Mittal : Differential Calculus, Sultan Chand & Sons.

Bachelor of Science (Medical and Non Medical) SEMESTER–II
SESSION: 2021-22
COURSE CODE: BSMM/BSNM-2084(I)
COURSE TITLE: INORGANIC CHEMISTRY(I)(THEORY)

Course outcomes:

Students will be able to

CO1: explain the atomic, physical and chemical properties of alkali metals and alkaline earth metals

CO2:recognise the anomalous properties of Li and compares the properties Li with those other alkali metals

CO3: recognises the anomalous properties of Be and compares the properties of Be with those other alkaline earth metals

CO4: explains the trends in atomic and physical properties of group 13 ,14,15,16,17 elements

explains chemical properties of above group elements

CO5: describe allotropic forms of elements

CO6: Exhaustive understanding of d–block elements belonging to 4^{th},5^{th} and 6^{th} period.

CO7: Understand the simple concepts of pH and complete and balance simple acid-base reactions.

Bachelor of Science (Medical and Non Medical) SEMESTER–II
SESSION: 2021-22
COURSE CODE: BSMM/BSNM-2084(I)
COURSE TITLE: INORGANIC CHEMISTRY(I)(THEORY)

Time: 3 Hrs. Max.Marks: 30

Instructions for the Paper Setter

Eight questions of equal marks(6 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

I. p–Block Elements–I (10 Hrs)

Comparative study (including diagonal relationship) of groups 13–17 elements, compounds like hydrides, oxides, oxyacids and halides of groups 13–16, hydrides of boron–diborane and higher boranes, Borazine, borohydrides, fullerenes.

UNIT-II

II. s-Block Elements (5 Hrs)

Comparative studies, diagonal relationship, salient features of hydrides, solvation and complexation tendencies.

III. Acids and Bases (5 Hrs)

Arrhenius, Bronsted-Lowry, the Lux-Flood, solvent system and Lewis concepts of acids and bases.

UNIT-III

IV. p–Block Elements-II (10 Hrs)

Carbides, fluorocarbons, silicates (structural principle), tetrasulphur tetranitride, basic properties of halogens, interhalogens and polyhalide,Silicones and phosphazenes as examples of inorganicpolymers, nature of bonding in triphosphazenes.

UNIT-IV

V. Chemistry of Transition Elements (15 Hrs)

Characteristic properties of *d*–block elements.Properties of the elements of the first transition series, their simple compounds and complexes illustrating relative stability of their oxidation states, coordination number and geometry.General characteristics of elements of Second and Third Transition Series, comparative treatment with their *3*d analogues in respect of ionic radii, oxidation states, magnetic behaviour.

Books Suggested:

1. Cotton, F.A., Wilkinson, G., Gaus, P.L., Basic Inorganic Chemistry; 2nd edition, Pubs: John Wiley and Sons, 1995.
2. Lee, J.D., Concise Inorganic Chemistry; 4th edition, Pubs: Chapman & Hall Ltd., 1991.
3. Shriver, D.E., Atkins, P.W., Inorganic Chemistry; 4th edition, Pubs: Oxford University Press, 2006.
4. Douglas, B., Medaniel, D., Atenander, J., Concepts and Models of Inorganic Chemistry; 3rd edition, Pubs: John Wiley and Sons Inc., 1994,
5. Porterfeild, W.W., Wesky, A., Inorganic Chemistry; Pubs: Addison-Wesky Publishing Company, 1984.
6. Miessler, G.L., Tarr, D.A., Inorganic Chemistry; 3rd edition, Pubs: Pearson Education Inc., 2004,
7. Jolly, W.L., Modern Inorganic Chemistry; 2nd edition, Pubs: Tata McGraw-Hill Publishing Company Limited, 1991.
8. Purcell, K.F., Kotz, J.C., Inorganic Chemistry; Pubs: W.B.Saunders Company, 1977.
9. Puri, B.R., Sharma, L.R., Kalia, K.K., Principles of Inorganic Chemistry; 30th edition, Pubs: Milestones Publisher, 2006-07.
10. Inorganic Chemistry, W.W. Porterfield Addison-Wesley.
11. Inorganic Chemistry, A.G. Sharpe, ELBS.

Bachelor of Science (Medical and Non Medical) SEMESTER–II
SESSION: 2021-22
COURSE CODE: BSMM/BSNM-2084(II)
COURSE TITLE: PHYSICAL CHEMISTRY(II)(THEORY)

Course outcomes:

Students will be able to

CO1: acquire the knowledge of structure and intermolecular forces present between solids, liquids and gases.

CO2: demonstrate an understanding of basic principles of colligative properties

CO3: understand the basic concepts of colloidal state of matter and applications of colloids.

CO4: explain various gaseous laws and their applications.

Bachelor of Science (Medical and Non Medical) SEMESTER–II
SESSION: 2021-22
COURSE CODE: BSMM/BSNM-2084(II)
COURSE TITLE: PHYSICAL CHEMISTRY(II)(THEORY)

Time: 3 Hrs. Max.Marks: 30

Note: Log table and Non-Programmable calculators are allowed

Instructions for the Paper Setter

Eight questions of equal marks (6 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

I. Gaseous States (11Hrs)

Postulates of kinetic theory of gases, deviation from ideal behaviour, van der Waal's equation of state.

Critical Phenomena: PV isotherms of real gases, continuity of states, the isotherms of van der Waal's equation, relationship between critical constants and van der Waals constants, the law of corresponding states, reduced equation of state.

Molecular Velocities: Root mean square, average and most probable velocities. Qualitative discussion of the Maxwell's distribution of molecular velocities, collision number, mean free path and collision diameter. Liquefaction of gases.

UNIT –II

II. Liquid State

Intermolecular forces, structure of liquids (a qualitative description). Structural differences between solids, liquids and gases. Liquid crystals: Difference between liquids crystal, solid and liquid.Classification, structure of nematic and cholestric phases. Thermography and seven segment cell.

UNIT –III

III. Colloidal State (11Hrs)

Definition of colloids, classification of colloids. Solids in liquids (Sol): kinetic, optical and electrical properties, stability of colloids,protective action, Hardy Schulze law, gold number. Liquids in liquids (emulsions): Types of emulsions, preparation. Emulsifiers.general applications of colloids.

UNIT –IV

IV.Solutions, Dilute Solutions and Colligative Properties (12Hrs)

Ideal and non–ideal solutions, methods of expressing concentrations of solutions, activity and activity coefficient. Dilute solution, colligative properties, Raoult's law, relative lowering of vapour pressure, molecular weight determination. Osmosis, Law of osmotic pressure and its measurement, determination of molecular weight from osmotic pressure. Elevation of boiling point and depression of freezing point, Thermodynamic derivation of relation between molecular weight and elevation in boiling point and depression in freezing point. Experimental methods for determining various colligative properties.Abnormal molar mass, degree of dissociation and association of solutes.

Books suggested:

1. Atkins, P., Paula, J.de, Atkins Physical Chemistry; 8th edition, Pubs: Oxford University Press, 2008.

2. Puri, B.R., Sharma, L.R., Pathania, M.S., Principles of Physical Chemistry; 43rd edition, Pubs: Vishal Publishing Co., 2008.

3. Barrow, G.M., Physical Chemistry; 6th edition, Pubs: McGraw Hill Inc, 1996.

4. Rao, C.N.R., University General Chemistry; Pubs: Macmillan India, 1985.

5. Berry, R.S., Rice, S.A., Ross, J., Physical Chemistry; 2nd edition, Pubs: Oxford University Press, 2000.

6. Albert, R.A., Silbey, R.J., Physical Chemistry; 1st edition, Pubs: John Wiley & Sons Inc.,1992.

7. Dogra, S.K., Dogra, S., Physical Chemistry Through Problems; Pubs:Wiley Eastern Limited, 1991.

8. Levine, I.N., Physical Chemistry; 5th edition, Pubs: Tata McGraw Hill Publishing Co. Ltd., 2002.

9. Moore, W. J., Basic Physical Chemistry; Pubs: Prentice Hall of India Pvt. Ltd, 1983.

10.University General Chemistry, C.N.R. Rao, Macmillan.

Bachelor of Science (Medical and Non Medical) SEMESTER–II
SESSION: 2021-22
COURSE CODE: BSMM/BSNM-2084(P)
COURSE TITLE: CHEMISTRY PRACTICAL

Course outcomes:

Students will be able to

CO1: understand the technique of crystallisation

CO2: compare the viscosity and surface tension of different liquids and solutions

CO3: determine the rate of the reactions

CO4: efficiently use of calorimeter in various experiments

Bachelor of Science (Medical and Non Medical) SEMESTER–II
SESSION: 2021-22
COURSE CODE: BSMM/BSNM-2084(P)
COURSE TITLE: CHEMISTRY PRACTICAL

Time: 3½ Hrs. Max.Marks:20

Instruction for practical examiner:Question paper is to be set on the spot jointly by the Internal and External Examiners.Two copies of the same should be submitted for the record to COE Office, Kanya Maha Vidyalaya, Jalandhar.

Crystallisation:

Concept of indication of crystalisation. Phthalic acid from hot water (using fluted filter paper & stem less funnel)

Acetanilide from boiling water.

Naphthalene from Ethanol

Benzoic acid from water

Physical Chemistry

1. To determine the specific reaction rate of hydrolysis of ethyl acetate catalysed by Hydrogen ions at room temperature.
2. To study the effect of acid strength on hydrolysis of an ester.

Viscosity, Surface Tension (Pure Liquids)

3. To study the viscosity and surface tension of CCl_4, glycerine solution in water.
4. To determine the solubility of benzoic acid at different temperatures and to determine ΔH of the dissolution process.
5. To determine the enthalpy of neutralisation of a weak acid/weak base versus strong base/strong acid and determine the enthalpy of ionisation of the weak acid/weak base.

6. To determine the enthalpy of dissolution of solid calcium chloride and calculate the lattice energy of calcium chloride from its enthalpy data using Born Haber cycle.

Practical Examination:		**Marks**
1)	Crystallisation	05
2)	Physical Experiment	10
3)	Viva–Voce	03
4)	Note Book	02

Books suggested :

1. Experimental Organic Chemistry, Vol. I & II, P.R. Singh, D.S. Gupta and K.S. Bajpai, Tata McGraw Hill.
2. Laboratory Manual in Organic Chemistry, R.K. Bansal, Wiley Eastern.
3. Vogel's Textbook of Practical Organic Chemistry, B.S. Furniss, A.J. Hannaford, V. Rogers, P.W.G. Smith and A.R. Tatchell, ELBS.
4. Experiments in General Chemistry, C.N.R. Rao and U.C. Aggarwal, East-West Press.
5. Experiments in Physical Chemistry, R.C. Das and B. Behra, Tata McGraw Hill.
6. Advanced Practical Physical Chemistry, J.B. Yadav, Goel Publishing House.
7. Advanced Experimental Chemistry, Vol. I, Physical, J.N. Guru and R. Kapoor, S. Chand & Co.
8. Selected Experiments in Physical Chemistry, N.G. Mukherjee, J.N. Ghosh & Sons.
9. Experiments Physical Chemistry, J.C. Ghosh, Bharati Bhavan.

SEMESTER–II
PHYSICS
RELATIVITY AND ELECTROMAGNETISM
(THEORY)
Course code: BSNM-2395 (I) for B.Sc. (Non Medical)
BCSM-2395 (I) for B.Sc. (Computer Science)

Course Outcomes: Relativity & Electromagnetism -Paper (A)

After passing this course, students will be able to:

CO1: understand special theory of relativity and related basic concepts and applications.

CO2: derive Maxwell equations and their applications in propagation of e.m. waves in conductors and insulators.

CO3: apply the Biot Savart's Law and Ampere's circuital law in different situations and frames.

CO4: understand the Faraday's Law of electromagnetic induction and LCR circuits.

SEMESTER–II
Session -2021-22
PHYSICS
RELATIVITY AND ELECTROMAGNETISM
(THEORY)
Course code: BSNM-2395 (I) for B.Sc. (Non Medical)
BCSM-2395 (I) for B.Sc. (Computer Science)

Time: 3 Hours Marks: 30 Pass Marks: 11

Instructions for the Paper Setters:

Eight questions of equal marks 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. Each question carries 6 marks.

Note: Students can use Non-Scientific calculators or logarithmic tables.

UNIT–I

Postulates of special theory of relatively. Lorentz transformations, observer and viewer in relativity. Relativity of simultaneity, Length, Time, velocities. Relativistic Dopper effect. Variation of mass with velocity, mass–energy equivalence, rest mass in an inelastic collision, relativistic momentum & energy, their transformation, concepts of Murkowski space, four vector
formulation.

UNIT–II

Lorentz's force, Definition of B. Biot Savart's Law and its application to long straight wire, circular current loop and solenoid. Ampere's Circuital law and its application. Divergence and curl of B. Hall effect, expression and co–efficient. Vector potential, Definition and derivation, current–density–definition, its use in calculation of charge in magnetic field at a current sheet. Transformation equation of E and B from one frame to another.

UNIT–III

Faraday's Law of EM induction, Displacement current, Mutual inductance and reciprocity theorem. Self inductance, L for solenoid, Coupling of Electrical circuits. Analysis of LCR series and parallel resonant, circuits Q–factor, Power consumed, power factor.

UNIT–IV

Maxwell's equations their derivation and characterizations, E.M. waves and wave equation in a medium having finite permeability and permittivity but with conductivity $\sigma = 0$). Poynting vector, impedance of a dielectric to EM waves. EM waves in a conducting medium and Skin depth. EM wave velocity in a conductor and anomalous dispersion. Response of a conducting medium to EM waves. Reflection and transmission of EM waves at a boundary of two dielectric media for normal and oblique incidence.

Recommended Books:

1. Introduction to Electrodynamics by D.J. Griffiths-Pearson Education Ltd., New Delhi, 1991
2. Physics of Vibrations and Waves by H.J. Pain.
3. EM Waves and Radiating Systems by Edward C. Jordan and K.G. Balmain.
4. Fields and Waves Electromagnetic by David K. Cheng.

SEMESTER–II
PHYSICS
VIBRATION AND WAVES
(THEORY)
Course code: BSNM-2395 (II) for B.Sc. (Non Medical)
BCSM-2395 (II) for B.Sc. (Computer Science)

After passing this course the student will be able to:

CO1: demonstrate Lissajous figures by mechanical and analytical method with different cases.

CO2: understand Free, damped and resonance oscillations, both mechanical and electric using differential equations.

CO3: solve differential equation of forced oscillations & to obtain related quantities.

CO4: understand concept of coupled oscillators and wave motion. Student will also be able to apply the concept of waves and oscillations to any type of waves like e. m. waves, mechanical waves.

SEMESTER–II
Session 2021-22
PHYSICS
VIBRATION AND WAVES
(THEORY)
Course code: BSNM-2395 (II) for B.Sc. (Non Medical)
BCSM-2395 (II) for B.Sc. (Computer Science)

Time: 3 Hours Marks: 30

Pass Marks: 11

Instructions for the Paper Setters:
Eight questions of equal marks 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. Each question carries 6 marks.

Note: Students can use Non-Scientific calculators or logarithmic tables.

UNIT–I

Simply harmonic motion, energy of a SHO. Compound pendulum. Torsional pendulum Electrical Oscillations Transverse Vibrations of a mass on string, composition of two Perpendicular SHM of same period and of period in ratio 1:2.

UNIT–II

Decay of free Vibrations due to damping. Differential equation of motion, types of motion, types of damping. Determination of damping co–efficient– Logarithmic decrement, relaxation time and Q–Factor. Electromagnetic damping (Electrical oscillator).

UNIT–III

Differential equation for forced mechanical and electrical oscillators. Transient and steady state behaviour. Displacement and velocity variation with driving force frequency, variation of phase with frequency, resonance. Power supplied to an oscillator and its variation with frequency. Q–value and band width. Q–value as an amplification factor. Stiffness coupled oscillators, Normal co–ordinates and normal modes of vibration. Inductance coupling of electrical oscillators.

UNIT–IV

Types of waves, wave equation (transverse) and its solution characteristic impedance of a string. Impedance matching. Reflection and Transmission of waves at boundary. Reflection and transmission of energy. Reflected and transmitted energy coefficients. Standing waves on a string of fixed length. Energy of vibration string. Wave and group velocity.

Recommended Books:

1. Fundamentals of Vibrations and Waves by S.P. Puri.
2. Physics of Vibrations and Waves by H.J. Pain.

SEMESTER–II
PHYSICS PRACTICAL

Course code: BSNM-2395 (P) for B.Sc. (Non Medical)
BCSM-2395 (P) for B.Sc. (Computer Science)

COURSE OUTCOMES

CO1: Students will be able to study resonance in series & parallel LCR circuit.

CO2: At the end of this course, students will be able to find the value of capacitor, coefficient of self inductance, permeability & permittivity of air.

CO3: Students will be able to study the variation of magnetic field on the axis of coil & can find the value of horizontal component of magnetic field.

SEMESTER–II
PHYSICS PRACTICAL

Course code: BSNM-2395 (P) for B.Sc. (Non Medical)
BCSM-2395 (P) for B.Sc. (Computer Science)
Session-2021-22

Instructions to Practical Examiner
Question paper is to be set on the spot jointly by the external and internal examiners. Two copies of the same to be submitted for the record to COE office, Kanya Maha Vidyalaya, Jalandhar

General Guidelines for Practical Examination: (4.5h/week)
I. The distribution of marks is as follows: **Marks: 20**
i) One experiment **7 Marks**
ii) Brief Theory **3 Marks**
iii) Viva–Voce **5 Marks**
iv) Record (Practical file) **5 Marks**
II. There will be one sessions of 3 hours duration. The paper will have one session.
Paper will consist of 8 experiments out of which an examinee will mark 6 experiments and one of these is to be allotted by the external examiner.
III. Number of candidates in a group for practical examination should not exceed 12.
IV. In a single group no experiment is to be allotted to more than three examinees in any group.

LIST OF EXPERIMENTS
1. To determine low resistance with Carey-Foster's Bridge.
2. To study the magnetic field produced by a current carrying solenoid using a search coil and calculate permeability of air.
3. To study the induced e.m.f. as a function of the velocity of the magnet.
4. Study of phase relationships using impedance triangle for LCR circuit and calculate impedance.
5. Resonance in a series and parallel LCR circuits for different R–value and calculate Q–value.
6. Capacitance by flashing and quenching of a neon lamp.
7. Measurement of capacitance, determination of permittivity of a medium air and relative permittivity by de–Sauty's bridge.
8. To determined L using Anderson Bridge.
9. To find the value of BH the horizontal component of earth's magnetic field in the lab using a deflection & vibration magnetometer.
10. To study the variation of magnetic field with distance along the axis of coil carrying current by plotting a graph.

Bachelor of Arts/ Bachelor of Science (Economics, Non-Medical, Computer Science) Semester–III

Session: 2021-22
Course Title: Mathematics (Analysis)

Course Code: BARM/ BECM/ BCSM/ BSNM-3333(I)

Course Outcomes

After passing this course, the students will be able to:

CO 1: Demonstrate an understanding of limits and how they are used in sequences and series.

CO 2: To understand the concepts of Riemann sum, partitions, upper and lower sums, Riemann integrability of continuous functions and of monotone functions.

CO 3: To know and describe the converging behavior of improper integrals and Beta , Gamma functions.

CO 4: Distinguish between the absolute convergence and conditional convergence.

CO 5: To find the relation between Beta and Gamma functions.

Bachelor of Arts/ Bachelor of Science (Economics, Non-Medical, Computer Science) Semester–III

Session: 2021-22
Course Title: Mathematics (Analysis)

Course Code: BARM/ BECM/ BCSM/ BSNM-3333(I)

Examination Time: 3 hrs. Max.Marks:50

Theory:40CA:10

Instructions for the Paper Setter: Eight questions of equal marks (8 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.

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Unit-I

Definition of a sequence.Theorems on limits of sequences.Bounded and monotonic sequences.Cauchy's convergence criterion.

Unit-II

Series of non-negative terms.Comparisontests.Cauchy's integral tests.Ratiotests.Cauchy's root test.Raabe's test, logarithmic test.Demorgan's and Bertrand's tests.Kummer's test, Cauchy Condensation test, Gauss test, Alternating series. Leibnitz's test, absolute and conditional convergence.

Unit-III

Partitions, Upper and lower sums.Upper and lower integrals, Riemann integrability.Conditions of existence of Riemann integrability of continuous functions and of monotone functions.Algebra of integrable functions.

Unit-IV

Improper integrals and statements of their conditions of existence. Test of the convergence of improper integral, beta and gamma functions.

Text Book:

Ajit Kumar and S. Kumaresan : A Basic Course in Real Analysis, CRC Press

Reference Books:

1. Malik, S.C.: Mathematical Analysis, Wiley Eastern Ltd. (1991).
2. Apostal, T.M.: Mathematical Analysis, Addison Wesley Series in Mathematics (1974).

Bachelor of Arts/ Bachelor of Science (Economics, Non-Medical, Computer Science) Semester–III

Session: 2021-22
Course Title: Mathematics (Analytical Geometry)

Course Code: BARM/ BECM/ BCSM/ BSNM-3333(II)

Course Outcomes

After passing this course, the students will be able to:

CO 1: Understand the concept of the geometry of lines and conics in the Euclidian plane.

CO 2: Develop geometry with a degree of confidence and will gain fluency in the basics of Euclidian geometry.

CO 3: Sketch conic sections; identify conic sections, their focal properties and classifications.

CO 4: Demonstrate the concept of parabola, ellipse, hyperbola, sphere and the general quadratic equation.

CO 5: Understand the concept of coordinate geometry on a wider scale with the help of shifting of origin and rotation of axis.

Bachelor of Arts/ Bachelor of Science (Economics, Non-Medical, Computer Science) Semester–III

Session: 2021-22
Course Title: Mathematics (Analytical Geometry)

Course Code: BARM/ BECM/ BCSM/ BSNM-3333(II)

Examination Time: 3 hrs. Max.Marks:50

Theory:40

CA:10

Instructions for the Paper Setter: Eight questions of equal marks (8 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

Transformation of axes, shifting of origin, Rotation of axes in two dimension and three dimension, the invariants, Joint equation of pair of straight lines, equations of bisectors

Unit-II

Parabola and its properties. Tangents and normal, Pole and polar, pair of tangents at a point, Chord of contact, equation of the chord in terms of mid point and diameter of conic.

Unit-III

Ellipse and hyperbola with their properties.Tangents and normal, Pole and polar.pair of tangents at a point, Chord of contact, Identifications of curves represented by second degree equation (including pair of lines).

Unit-IV

Intersection of three planes, condition for three planes to intersect in a point or along a line or to form a prism. Sphere: Section of a sphere by a plane, spheres of a given circle. Intersection of a line and a sphere.Tangent line, tangent plane, power of a point with respect to a sphere, radical planes.

Text Book:

S.L. Loney: The Elements of Coordinate Geometry, Macmillan and Company, London.

Reference Books:

1. Gorakh Prasad and H.C. Gupta: Text Book on Coordinate Geometry.
2. Narayan, S and P.K.Mittal.: Analytical Solid Geometry, Sultan Chand & Sons (2005).
3. Kreyszig, E.: Advanced Engineering Mathematics.
4. Thomos, G.B. and Finney, R.L.: Calculus and Analytic Geometry.

Bachelor of Science (Med & Non-Medical) SEMESTER–III
SESSION: 2021-22
COURSE CODE: BSMM/BSNM-3084
ORGANIC CHEMISTRY–I
(THEORY)

Course outcomes:

Students will be able to

CO1: to resolve the different enantiomers and differentiate between dextrorotatory and leavorotatory compounds

CO2: understand the concept of isomerism

CO3: differentiate between chiral and achiral compounds, configuration and conformation

CO4: understand the concept of axial and equatorial bonds and draw the various projection formulae

CO5: understand the methods of formation, chemical reactions, acidic character of alcohols

CO6: understand structure and bonding, preparation of phenols, acidic character of phenols

CO7: understand structure and bonding in phenols and carbonyl compounds

CO8: compare reactivity of aliphatic and aromatic aldehydes and ketones

CO9: understand the various reactions given by carbonyl compounds

Bachelor of Science (Med & Non-Medical) SEMESTER–III
SESSION: 2021-22
COURSE CODE: BSMM/BSNM-3084
ORGANIC CHEMISTRY–I
(THEORY)

Time: 3 Hrs. Max. Marks: 30

Instructions for the Paper Setter

Eight questions of equal marks (6 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

Stereochemistry of Organic Compounds

Concept of isomerism,types of isomerism, Optical isomerism, elements of symmetry, molecular chirality, enantiomers, stereogeniccentre, optical activity, properties of enantiomers, chiral and achiral molecules with two stereogeniccentres, diastereomers, threo and erythrodiasteremers, meso compounds, resolution of enantiomers, inversion, retention and racemization. Relative and absolute configuration, sequence rules, D & L and R & S systems of nomenclature. Geometric isomerism–determination of configuration of geometric isomers. E & Z system of nomenclature. Conformational isomerism–conformational analysis of ethane and n–butane; conformation of cyclohexane, axial and equatorial bonds, conformation of mono substituted cyclohexane derivatives. Newman projection and Sawhorse formulae, Fischer and flying wedge formulae. Difference between configuration and conformation.

Unit–II

Alcohols

Classification and nomenclature.Monohydric alcohols—nomenclature, Acidic nature, Reactions of alcohols, Dihydric alcohols—nomenclature, methods of formation, chemical reactions of vicinal glycols, oxidative cleavage [$Pb(OAc)_4$] and [HIO_4] and pinacol-pinacolone rearrangement.

Unit–III

Phenols

Nomenclature, structure and bonding, preparation of phenols, physical properties and acidic character, Comparative acidic strengths of alcohols and phenols, resonance stabilization of phenoxide ion.Reactions of phenols—electrophilic aromatic substitution, acylation and carboxylation.Mechanisms of Fries rearrangement, Claisen rearrangement, Gatterman synthesis, Reimer Tiemann reaction.

Unit–IV

Aldehydes and Ketones Nomenclature and structure of the carbonyl group. Synthesis of aldehydes and ketones with particular reference to the synthesis of aldehydes from acid chlorides, synthesis of aldehydes and ketones using 1,3-dithianes, synthesis of ketones from nitriles and from carboxylic acids. Physical properties.Mechanism of nucleophilic additions to carbonyl group with particular emphasis on benzoin, aldol, Perkin and Knoevenagel condensations.Condensation with ammoniaand its derivatives. Witting reaction,Mannichreaction.Use of acetals as protecting group.Oxidation of aldehydes, Baeyer-Villiger oxidation of Ketones, Cannizzaro reaction.MPV, Clemmensen, Wolff-Kishner, $LiAlH_4$ and $NaBH_4$ reductions. Halogenation of enolizable ketones. Halogenation of enoliable ketones

Books suggested:

1. Morrison, R.T., Boyd, R.N., Organic Chemistry; 6th edition, Pubs: Prentice-Hall, 1992.
2. Wade Jr., L.G., Singh, M.S., Organic Chemistry; 6th edition, Pubs: Pearson Education, 2008.
3. Mukherji, S.M., Singh, S.P., Kapoor, R.P., Organic Chemistry; Pubs: Wiley Eastern Limited, 1985, Vol. I, II, III.
4. Solomons, T.W., Fryhle, C.B., Organic Chemistry; 9th edition, Pubs: Wiley India, 2007.
5. Carey, F.A., Organic Chemistry; 4th edition, Pubs: McGraw-Hill, 2000.
6. Streitwieser, A., Clayton, Jr., Heathcock, H., Introduction to Organic Chemistry; 3rd edition, Pubs:Macmillan Publishing Company, 1989.
7. University General Chemistry, C.N.R. Rao, Macmillan.

Bachelor of Science (Med & Non-Medical) SEMESTER–III
SESSION: 2021-22
COURSE CODE: BSMM/BSNM-3084
PHYSICALCHEMISTRY–II
(THEORY)

Course outcomes:

Students will be able to

CO1: understand and evaluate thermodynamic property of any system and its applications to various systems.

CO2: acquire the knowledge of phase equilibria of various systems.

CO3: understand completely miscible, partially miscible and immiscible liquids.

CO4: understand concept of spontaneity of a reaction in terms of free energy change.

CO5: demonstrate Vant' Hoff equation and relationship between equilibrium constants.

CO6: demonstrate Clausius-Clapeyron equation.

Bachelor of Science (Med & Non-Medical) SEMESTER–III
SESSION: 2021-22
COURSE CODE: BSMM/BSNM-3084
PHYSICALCHEMISTRY–II

(THEORY)

Time: 3 Hrs. Max. Marks: 30

Instructions for the Paper Setter

Eight questions of equal marks (6 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

Thermodynamics-I

Definition of thermodynamic terms: System, surroundings etc. Types of systems, intensive and extensive properties. State and path functions and their differentials. Thermodynamic process. Concept of heat and work.

First Law of Thermodynamics:

Statement, definition of internal energy and enthalpy. Heat capacity, heat capacities at constant volume and pressure and their relationship. Joule's law-Joule-Thomson coefficient and inversion temperature, Calculation of w,q,dU&dH for the expansion of ideal gases under isothermal and adiabatic conditions for reversible process.

Thermochemistry:

Standard state, standard enthalpy of formation-Hess's Law of heat summation and its applications. Heat of reaction at constant pressure and at constant volume. Enthalpy of neutralization. Bond dissociation energy and its calculation from thermo-chemical data, temperature dependence of enthalpy. Kirchhoff's equation.

Unit–II

Thermodynamics-II

Second Law of Thermodynamics: Need for the law, different statements of the law, Carnot cycle and its efficiency, Carnot theorem. Thermodynamic scale of temperature.

Concept of Entropy: Entropy as a state function, entropy as a function of V & T, entropy as a function of P & T, entropy change in physical change, Clausius inequality, entropy as a criteria of spontaneity and equilibrium. Entropy change in ideal gases and mixing of gases.

Unit–III

Thermodynamics-III

Third Law of Thermodynamics: Nernst heat theorem, statement and concept of residual entropy, evaluation of absolute entropy from heat capacity data. Gibbs and Helmholtz functions; Gibbs function (G) and Helmholtz function (A) as thermodynamic quantities, A &G as criteria for thermodynamic equilibrium and spontaneity, their advantage over entropy change, Variation of G and A with P,V and T.

Chemical Equilibrium

Equilibrium constant and free energy. Thermodynamic derivation of law of mass action. Determination of K_p, K_c, $K_a$and their relationship, Clausius-Clapeyron equation, applications.

Unit–IV

Introduction to Phase Equilibrium

Statement and meaning of the terms-phase, component and degree of freedom, derivation of Gibbs phase rule, phase equilibria of one component system-water, CO_2 and S systems. Phase equilibria of two component systems-solid-liquid equilibria, simple eutectic-Bi-Cd, Pb-Ag systems, desilverisation of lead. Solid solutions-compound formation with congruent melting point (Mg-Zn) and incongruent melting point, (NaCl-H_2O), $FeCl_3$-H_2O) and $CuSO_4$-H_2O) system. Freezing mixtures, acetone-dry ice. Non-ideal system-azeotropes-HCl-H_2O and ethanol-water system. Partially miscible liquids Phenol-water, trines-thylamin-water, Nicotine-water System. Lower and upper consulate temperature, Effect of impurity on consolute temperature, immiscible liquids, steam distillation. Nernst distribution law-thermodynamic derivation and applications.

Books suggested:

1. Atkins, P., Paula, J.de, Atkins Physical Chemistry; 8th edition, Pubs: Oxford University Press, 2008.

2. Puri, B.R., Sharma, L.R., Pathania, M.S., Principles of Physical Chemistry; 43rd edition, Pubs: Vishal Publishing Co., 2008.

3. Barrow, G.M., Physical Chemistry; 6th edition, Pubs: McGraw Hill Inc, 1996.
4. Rao, C.N.R., University General Chemistry; Pubs: Macmillan India, 1985.
5. Berry, R.S., Rice, S.A., Ross, J., Physical Chemistry; 2nd edition, Pubs: Oxford University Press, 2000.
6. Albert, R.A., Silbey, R.J., Physical Chemistry; 1st edition, Pubs: John Wiley & Sons Inc., 1992.
7. Dogra, S.K., Dogra, S., Physical Chemistry Through Problems; Pubs:Wiley Eastern Limited, 1991.
8. Levine, I.N., Physical Chemistry; 5th edition, Pubs: Tata McGraw Hill Publishing Co. Ltd., 2002.
9. Moore, W. J., Basic Physical Chemistry; Pubs: Prentice Hall of India Pvt. Ltd, 1983.
10. Metz, C.R., Theory and Problems of Physical Chemistry; Schaum's outline series, 2nd edition, Pubs: McGraw-Hall Book company, 1989.

Bachelor of Science (Med & Non-Medical) SEMESTER–III
SESSION: 2021-22
COURSE CODE: BSMM/BSNM-3084(P)
CHEMISTRY PRACTICAL

Course outcomes:

Students will be able to

CO1: understand and master the technique of volumetric analysis

CO1: to understand and analyze an acidic & alkali content in different samples.

CO2: to understand and analyze the calcium content in various samples permanganometrically

CO4: to understand the concept of hardness of water and its analysis by EDTA method

CO5: understand and master the technique of gravimetric analysis

CO6: to understand the concept of TLC and its applications.

Bachelor of Science (Med & Non-Medical) SEMESTER–III
SESSION: 2021-22
COURSE CODE: BSMM/BSNM-3084(P)
CHEMISTRY PRACTICAL

Duration: 3½ Hrs. Max. Marks: 20

Instruction for practical examiner:Question paper is to be set on the spot jointly by the Internal and External Examiners. Two copies of the same should be submitted for the record to COE office, Kanya Maha Vidyalaya, Jalandhar.

Quantitative Analysis

Volumetric Analysis

a. Determination of acetic acid in commercial vinegar using NaOH.

b. Determination of alkali content-antacid tablet using HCI.

c. Estimation of calcium content in chalk as calcium oxalate by permanganometry.

d. Estimation of hardness of water by EDTA.

e. Estimation of ferrous and ferric by dichromate method.

f. Estimation of copper using sodiumthiosulphate.

Gravimetric Analysis

Analysis of Cu as CuSCN and Ni as Ni (dimethylgloxime)

Organic Chemistry Laboratory Techniques

Thin Layer Chromatography

Determination of R_f values and identification of organic compounds.

(a). Separation of green leaf pigments (spinach leaves may be used).

(b). Preparation and separation of 2, 4. dinitrophenylhydrazones of acetone, 2-butone, 2-Butanone, hexan-2 and 3-one using toluene and light petroleum (40 : 60).

(c). Separation of a mixture of dyes using cyclohexane and ethyl acetate (8.5:1.5).

Practical Examination

1) Volumetry / Gravimetry	11
2) Thin Layer chromatography	04
3) Viva-Voce	03
4) Note Book	02

Books suggested:

1. Vogel's Textbook of Quantitative Inorganic Analysis (revised), J. Bassett, R.C. Denney, G.H. Jeffery and J. Mandham, ELBS.
2. Standard Methods of Chemical. Analysis, W.W. Scott: The Technical Press.
3. Experimental Inorganic Chemistry, W.G. Palmer, Cambridge.
4. Laboratory Manual in Organic Chemistry, R.K. Bansal, Wiley Eastern.
5. Vogel's Textbook of Practical Organic Chemistry, B.S. Furniss, A.J. Hannaford, V. Rogers, P.W.G. Smith and A.R. Tatchell, ELBS.
6. Experiments in General Chemistry, C.N.R. Rao and U.C. Aggarwal, East-West Press.
7. Experimental Organic Chemistry, Vol. I & II, P.R. Singh, D.S. Gupta and K.S. Bajpai, Tata McGraw Hill

SEMESTER II

Course Outcomes: PHY-Statistical Physics and Thermodynamics

Course code: BCSM-3395 (I)

After passing this programme the students will be able to:

CO1: Understand the basic ideas and scope of probability as well as distribution of n particles in different compartments.

CO2: Concept of different types of Statistics and the need for Quantum Statistics.

CO3: Understand the concept of entropy, Laws of Thermodynamics and applications to thermoelectric effect.

CO4: Understand the Maxwell Thermodynamics relations, Change of state and Claypron equation.

SEMESTER-III PHYSICS
Session2021-22
Course code: BCSM-3395 (I)
PAPER-A
STATISTICAL PHYSICS & THERMODYNAMICS
(THEORY)

Time: 3 Hours Marks: 30

Pass Marks: 11

Instructions for the Paper Setters:
Eight questions of equal marks 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. Each question carries 6 marks.

Note: Students can use Non-Scientific calculators or logarithmic tables.

UNIT–I

Basic ideas of Statistical Physics, Scope of Statistical Physics, Basic ideas about probability, Distribution of four distinguishable particles into compartments of equal size. Concept of macro states, microstates, Thermodynamic Probability, Effects of constraints on the system. Distribution of n particles in two compartments, Deviation from the state of maximum probability. Equilibrium state of dynamic system, Distribution of distinguishable n particles in k compartments of unequal sizes.

UNIT–II

Phase space and division into elementary cells. Three kinds of statistics. The basic approach in three statistics. Maxwell Boltzmann (MB) statistics applied to an ideal gas in equilibrium. Experimental verification of law of distribution of molecular speeds. Need for Quantum Statistics – B.E. Statement of Planck's law of Radiation Wien's Displacement and Stefan's law. Fermi Dirac (FD) statistics. Comparison of M.B, B.E and F.D statistics.

UNIT–III

Statistical definition of entropy, Change of entropy of system, additive nature of entropy, Law of increase of entropy, Reversible and irreversible processes, and their examples, work done in reversible process, examples of increase in entropy in natural processes, entropy and disorder, Brief review of Terms, Laws of Thermodynamics, Carnot Cycle, Entropy changes in Carnot cycle, Absolute thermodynamics or Kelvin Scale of Temperature, Applications of thermodynamics to thermoelectric effect, Peltier Effect, Thomson Effect, change of entropy along reversible path in P-V diagram. Heat death of universe.

UNIT–IV

Derivation of Maxwell Thermodynamics relations, Cooling produced by adiabatic stretching, A diabetic Compression, change of internal energy with volume, Specific heat and constant pressure and constant volume. Expression for C_P-C_V, Change of state and Claypron equation, Joule-Thomson effect.

Text Reference Books:

1. Statistical Physics and Thermodynamics by V.S. Bhatia (Sohan Lal Nagin Chand), Jal.
2. A Treatise on Heat by M.N. Saha& B.N. Srivastava (The Indian Press Pvt. Ltd., Allahabad), 1965.
3. Statistical Mechanics: An Introductory Text by Bhattacharjee, J.K. (Allied Pub., Delhi), 2000.
4. Statistical Physics by Bhattacharjee, J.K. (Allied Pub., Delhi) 2000.
5. Statistical Mechanics by B.B. Laud, (Macmillan India Ltd.) 1981.

Course Outcomes: PHY-OPTICS

Course code: BCSM-3395 (II)

After passing this programme the students will be able to:

CO1: understand the concept of interference of waves by division of wave front and its different methods and concept of coherence.

CO2: understand the interference of waves by division of Amplitude and its methods and will have knowledge of interferometers

CO3: understand the Huygen's Fresnel theory and diffraction, Fraunhoffer diffraction due to single slit, double slit and n slits, the concept of resolving power.

CO4: understand the concept the polarization of light and types of polarisers.

SEMESTER–III

Session 2021-22
PHYSICS
Course Code: BCSM-3395 (II)
PAPER–B: OPTICS
(THEORY)

Time: 3 Hours Marks: 30

Pass Marks: 11

Instructions for the Paper Setters:
Eight questions of equal marks 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. Each question carries 6 marks.

Note: Students can use Non-Scientific calculators or logarithmic tables.

UNIT–I

Interference of Light:
Superposition of light waves and interference, Young's double slit experiment, Distribution of intensity in Young's double slit experiment, Conditions for sustained interference pattern,
Coherent sources of light, Temporal and spatial coherence, Mathematical analysis of temporal coherence, Interference pattern by division of wave front, Fresnel Biprism, Fresnel double mirror, Llyod's single mirror, Achromatic fringes. Displacement of fringes,

UNIT–II

Interference by Division of Amplitude:
Change of phase on reflection, Interference in thin films due to reflected and transmitted light, Interference in parallel and wedge shaped films, Colour of thin films.Need for extended source for interference by division of amplitude, non-reflecting films, Newton's Rings. Michelson Interferometer, Fabry Perot interferometer and etalon. Distribution of intensity in Fabry Perot fringes.

UNIT–III

Diffraction:
Huygens's fresnel theory, half-period zones, Zone plate, Distinction between Fresnel and
Fraunhoffer diffraction. Fraunhoffer diffraction due to single slit, rectangular and circular aperture, double slits and plane transmission grating, Effect of diffraction in optical imaging, its use as a spectroscopic element and its resolving power, Resolving power of telescope, of diffraction grating, of microscope and of Fabry-Perot interferometer.

UNIT–IV

Polarization:
Plane Polarized light, Elliptically polarized light, wire grid polarizer, Sheet polarizer, Maul's
Law, Brewster Law, Polarization by reflection and scattering, Double refraction, Nicol prism,
Retardation plates, Production and Analysis of plane, circularly and elliptically polarized light, Quarter and half wave plates, Optical activity

Text Reference Books:

1. Fundamentals of Optics by F.A. Jenkins and Harvey E White, (Mcgraw Hill) 4th Edition, 2001.
2. Optics, AjoyGhatak by (McMillan Indian) 2nd Edition, 7th Reprint, 1997.
3. Optics by Born and Wolf, (Pergamon Press) 3rd Edition, 1965.
4. Physical Optics by B. K. Mathur and T. P. Pandya.
5. A textbook of Optic by N. Subrahmanyam, Brijlal and M. N. Avadhanulu.
6. Geometrical and Physical Optics by Longhurst.
7. Introduction to Modern Optics by G. R. Fowels.
8. Optics by P. K. Srivastav.

Course Outcomes: SEMESTER–III PHYSICS (PRACTICAL)

Course code: BCSM-3395 (P)

After passing this programme the students will be able to:

CO1: use spectrometer to determine the refractive index of different transparent materials wills dispersive power and resolving power of different transparent prisms and liquids using spectrometer.

CO2: use diffraction grating and apply it to determine dispersive power, resolving power, the wavelengths of Hg source and the Cauchy's constants.

CO3: to measure an accessible (Horizontal and vertical) and inaccessible heights using sextant.

CO4: set up of Newton's rings to determine wavelength of sodium light.

CO5: demonstrate the verification of laws of probability distribution.

SEMESTER–III
Session2021-22
PHYSICS
Course Code: BCSM-3395 (P)
(PRACTICAL)

Instructions to Practical Examiner

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

General Guidelines for Practical Examination

I. The distribution of marks is as follows: **Marks: 20**
i) One experiment **7 Marks**
ii) Brief Theory **3 Marks**
iii) Viva–Voce **5 Marks**
iv) Record (Practical file) **5 Marks**
II. There will be one sessions of 3 hours duration. The paper will have one session.
Paper will consist of 8 experiments out of which an examinee will mark 6 experiments and one of these is to be allotted by the external examiner.
III. Number of candidates in a group for practical examination should not exceed 12.
IV. In a single group no experiment is to be allotted to more than three examinees in any group.

List of Experiments

1. To determine refractive index of glass and liquid using spectrometer.
2. To determine the Cauchy's constants.
3. To study the refractive index of a doubly refracting prism.
4. To set up Newton's rings to determine wavelength of sodium light.
5. To determine the wavelength by using plane diffraction grating (Use Hg source)
6. To determine dispersive power of plane diffraction grating.
7. To determine resolving power of a telescope.
8. To measure an accessible (Horizontal and vertical) height using sextant.
9. To measure inaccessible height by using sextant.
10. Verify laws of probability distribution by throwing of similar coins.
11. To determine the wavelength of given laser source using Young's double slit experiment

Bachelor of Arts/ Bachelor of Science (Economics, Non-Medical, Computer Science)

Semester–IV

Session: 2021-22

Course Title: Mathematics (Statics and Vector Calculus)

Course Code: BARM/BECM/ BCSM/BSNM-4333(I)

Course Outcomes

After passing this course, the students will be able:

CO 1: To apply parallelogram law of forces, triangle law of forces, Lami's theorem to real life problems.

CO 2: To understand that how one can resolve number of coplanar forces, parallel forces and concurrent forces acting at a body.

CO 3: To find the moments of number of coplanar forces acting at a particle

CO 4: To find the resultant of a force and couple acting on a body.

CO 5: To find the applications of CG of a rod, triangular lamina, solid hemisphere, hollow hemisphere, solid cone and hollow cone.

CO 6: To find the values of gradient, divergence and curl operator of given vectors.

CO 7: To find the application of Gauss theorem, Green's theorem and Stokes's theorem in real life problems.

Bachelor of Arts/ Bachelor of Science (Economics, Non-Medical, Computer Science)Semester–

IV

Session: 2021-22
Course Title: Mathematics (Statics and Vector Calculus)

Course Code: BARM/BECM/ BCSM/BSNM-4333(I)

Examination Time: 3 Hours

Max.Marks:50

Theory :40

CA:10

Instructions for the Paper Setter: Eight questions of equal marks(8 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

Composition and resolution of forces(parallelogram law, triangle law, polygon law,Lami'sTheorem(ɜ-μ) theorem).Resultantof a number of coplanar forces, parallel forces. Moments ,Varignon's Theorem of moments, Couples , Resultant of two Coplanar Couples, Equilibrium of two coplanar couples, Resultant of a force and a couple, Equilibrium of coplanar forces.

Unit-II

Friction, Laws of friction, Equilibrium of a particle on a rough plane. Centre of Gravity: Centre of gravity of a rod, triangular lamina, solid hemisphere, hollow hemisphere, solid cone and hollow cone.

Unit-III

Vector differentiation, Gradient, divergence and curl operators, line integrals, Vector identity, and Vector integration.

Unit-IV

Theorems of Gauss, Green, Stokes and problems based on these.

Text Books:
1. N.P.Bali: Statics, Laxmi Publications (P) Ltd.
2. Spiegal,M.R.: Vector Analysis, Schaum's outline Series, McGraw Hill.

Reference Books:
1. S.L. Loney: Statics, Macmillan and Company, London.
2. R.S. Verma: A Text Book on Statics, Optical Pvt. Ltd., Allahabad.

Bachelor of Arts/ Bachelor of Science (Economics, Non-Medical, Computer Science)

Semester–IV

Session: 2021-22
Course Title: Mathematics (Solid Geometry)

Course Code: BARM/BECM/ BCSM/BSNM-4333(II)

Course Outcomes

After passing this course, the students will be able to:

CO 1: Demonstrate the concept of cone, classification of cone, intersection of line and cone, reciprocal cone.

CO 2: Understand the concept of cylinder, enveloping cylinder and its limiting form.

CO 3: Describe the concept of conicoids or quadratic surface, its classification, trace different types of conicoids.

CO 4: Manage to find surface of revolution and concept of tangent and normal to the conicoid

CO 5: Identify the conicoids and representing it in the form of hyperboloid, ellipsoid, paraboloid.

Bachelor of Arts/ Bachelor of Science (Economics, Non-Medical, Computer Science)

Semester–IV

Session: 2021-22
Course Title: Mathematics (Solid Geometry)

Course Code: BARM/BECM/ BCSM/BSNM-4333(II)

Examination Time: 3 Hours

Max.Marks:50

Theory :40

CA:10

Instructions for the Paper Setter: Eight questions of equal marks(8 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

Cylinder as surface generated by a line moving parallel to a fixed line and through fixed curve.Different kinds of cylinders such as right circular, elliptic, hyperbolic and parabolic in standard forms

Unit-II

Cone with a vertex at the origin as the graph of homogeneous equation of second degree in x, y, z . Cone as a surface generated by a line passing through a fixed curve and fixed point outside the plane of the curve. Right circular and elliptic cones.

Unit-III

Equation of surface of revolution obtained by rotating the curve f(x,y)=0 about the z-axis in the form of $f(x^2+y^2, z) =0$.Equation of ellipsoid, hyperboloid and Paraboloid in standard forms.

Unit-IV

Surfaces represented by general equation of 2nd degree S = 0. Tangent lines, tangent planes and Normal Plane.

Text Book:

P.K.Jain& Khalil Ahmed: A text book of Analytical Geometry of three dimensions, Wiley Eastern Ltd. 1999.

Reference Books:

1. Narayan, S &P.K.Mittal : Analytical Solid Geometry, Sultan Chand & Sons(2005)
2. Kreyszig, E : Advanced Engineering Mathematics

Bachelor of Science (Medical and Non- Medical) SEMESTER–IV
SESSION: 2021-22
COURSE CODE: BSMM/BSNM-4084(I)
COURSE TITLE: INORGANIC 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
CO2: understand the magnetic properties of coordination compounds by using CFT.
CO3: describe the shapes and structures of coordination complexes with coordination numbers ranging from 4 to 12.
CO4: do nomenclature of coordination compounds.
CO5: write both reduction and oxidation half reactions for a simple redox reaction
CO6: identify the oxidation number (charge) on a neutral metal, metal and non-metal ion
CO7:carry out the common applications of the activity series of metals
CO8: understand the Latimer, Frost and Pourbaix diagram.
CO9: understand the positions,electronicconfigurations,relativestability,preparation, properties, structures and characteristics of the f-block elements in the periodic table;
CO10: understand the role of metal ions and other inorganic elements in biological systems.
CO11: understandthe properties and reactions of non-aqueous solvents.

Bachelor of Science (Medical and Non- Medical) SEMESTER–IV
SESSION: 2021-22
COURSE CODE: BSMM/BSNM-4084(I)
COURSE TITLE: INORGANIC CHEMISTRY-I (THEORY)

Time: 3 Hrs. Max. Marks: 30

Note: Instructions for the Paper Setter

Eight questions of equal marks (6 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

Coordination Compounds (10 Hrs)

Werner's coordination theory and its experimental verification, effective atomic number concept, chelates, nomenclature of coordination compounds, isomerism in coordination compounds, valence bond theory of transition metal complexes

Non-AqueousSolvents (5 Hrs)

Physical properties of a solvent, types of solvents and their general characteristics, reactions in non-aqueous solvents with reference to liquid NH_3 and liquid SO_2.

Unit–II

Oxidation and Reduction (8 Hrs)

Use of redox potential data-analysis of redox cycle, redox stability in water, Frost, Latimer and Pourbaix diagrams

Chemistry of Lanthanide Elements (7 Hrs)

Electronic structure, oxidation states and ionic radii and lanthanide contraction. Electronic absorption and magnetic properties of lanthanides

Unit–III

Chemistry of Actinides **(5 Hrs)**

General features and chemistry of actinides, similarities between the later actinides and the later lanthanides. Electronic and magnetic properties of actinides and their general comparison with the lanthanide elements

Unit–IV

Bioinorganic Chemistry **(10 Hrs)**

Essential and trace elements in biological processes, metalloporphyrins and special reference to haemoglobin and myoglobin. Biological role of alkali and alkaline earth metal ions with special reference to Ca^{2+}

Books Suggested:

1. Cotton, F.A., Wilkinson, G., Gaus, P.L., Basic Inorganic Chemistry; 3rd edition, Pubs: John Wiley Sons. 1995.
2. Lee, J.D., Concise Inorganic Chemistry; 4th edition, Pubs: Chapman Hall Ltd., 1991.
3. Shriver, D.E., Alkins, P.W., Langford, C.H., Inorganic Chemistry; 4th edition, Oxford Publisher: Oxford University Press, 2006.
4. Douglas, B. McDamiel, D., Alexander, J., Concepts and Models of Inorganic Chemistry; 3rd edition, Pubs: John Wiley and Sons Inc., 1994.
5. Porterfield, W.W., Wesley, A., Inorganic Chemistry; Pubs: Addison-Wesley Publishing Company, 1984.
6. Miessler, G.L., Larr, D.A., Inorganic Chemistry; 3rd edition, Pubs: Pearson Education Inc., 2004.
7. Jolly, W.L., Modern Inorganic Chemistry; 2nd edition, Pubs: McGraw-Hill Publishing Company Limited, 1991.
8. Purcell, K.F., Kotz, J.C., Inorganic Chemistry; Pubs: W.B. Saunders Company, 1977.
9. Puri, B.R., Sharma, L.R., Kalia, K.C., Principles of Inorganic Chemistry; 30th edition, Pubs: Milestones Publisher, 2006-07.
10. Inorganic Chemistry, W.W. Porterfield Addison-Wesley.
11. Inorganic Chemistry, A.G. Sharpe, ELBS.
12. University General Chemistry, C.N.R. Rao, Macmillan.

Bachelor of Science (Medical and Non- Medical)SEMESTER–IV
SESSION: 2021-22
COURSE CODE: BSMM/BSNM-4084(II)
COURSE TITLE: ORGANIC CHEMISTRY-II(THEORY)

Course outcomes:

Students will be able to

CO1: understand structure and bonding in carboxylic acids and carboxylic acid derivatives

CO2: Compare the acidity of alcohols,phenols and acids

CO3: understand the effect of various substituents on the acidity of acids

CO4: describe preparations, physical properties,and reactions of carboxylic acids and carboxylic acid derivatives

CO5: understand preparations and reactions of ethers and epoxides

CO6: understand various cleavages in ethers

CO7: understand the ring opening reactions of epoxides

CO8:understand preparation and reactions of nitroalkanes and nitroarenes

CO9: understand nomenclature, structural features, and methods of formation and chemical reactions of Organomagnesium, Organolithium, Organozinc and Organocopper compounds.

CO10: know the various methods of synthesis and compare electrophilic substitution,reactions of pyrrole, furan, thiophene and nucleophilic substitution reactions of pyridine.

CO11: compare the basicity of pyridine, piperidine and pyrrole.

Bachelor of Science (Medical and Non- Medical)SEMESTER–IV
SESSION: 2021-22
COURSE CODE: BSMM/BSNM-4084(II)
COURSE TITLE: ORGANIC CHEMISTRY-II(THEORY)

Time: 3 Hrs. Max. Marks: 30

Note: Instructions for the Paper Setter

Eight questions of equal marks (6 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

Carboxylic Acids (8 Hrs)

Nomenclature, structure and bonding, physical properties, acidity of carboxylic acids, effects of substituents on acid strength.Reactions of carboxylic acids.Hell-Volhard-Zelinskyreaction.Synthesis of acid chlorides, esters and amides.Reduction of carboxylic acids.Mechanism of decarboxylation.

Carboxylic Acids Derivatives (7 Hrs)

Structure and nomenclature of acid chlorides, esters, amides and acid anhydrides, Relative stability & reactivity of acyl derivatives.Physical properties, interconversion of acid derivatives by nucleophilic acyl substitution.Preparation of carboxylic acid derivatives, chemical reactions.Mechanisms of esterification and hydrolysis (acidic and basic).

Unit–II

Ethers and Epoxides (5 Hrs)

Nomenclature of ethers and methods of their formation, physical properties.Chemical reaction- cleavage and autoxidation, Ziesel'smethod.Synthesis of epoxides. Acid and base-catalyzed ring opening ofepoxides, orientation of epoxide ring opening, reactions of Grignard and organolithium reagents with epoxides.

Unit-III

Organic Compounds of Nitrogen (10 Hrs)

Preparation of nitroalkanes and nitroarenes.Chemical reactions of nitroalkanes, Mechanisms of nucleophilc substitution in nitroarenes and their reduction in acidic, neutral and alkaline media.Reactivity, Structure and nomenclature of amines, Methods of preparation of amines by Reductive amination of aldehydic and ketonic compounds, Gabriel-phthalimide reaction and Hoffmann bromamide reaction.Physicalproperties.Stereochemistry of amines.separation of a mixture of primary, secondary and tertiary amines. Structural features affecting basicity of amines. Amine salts as phase-transfer catalysts.

Unit–IV

Organometallic Compounds (7 Hrs)

Organomagnesium Compounds: The Grignard reagentsformation, structure and chemical reactions.Organolithium Compounds: Formation and chemical reactions.Organozinc and Organo copper Compounds: Nomenclature, structural features, Methods of formation and chemical reactions.

Heterocyclic Compounds (8 Hrs)

Introduction: Molecular orbital picture and aromatic characteristics of pyrrole, furan, thiophene and pyridine. Methods of synthesis and chemical reactions with particular emphasis on the mechanism of electrophilic substitution.Mechanism of nucleophilic substitution reactions in pyridine derivatives.Comparison of basicity of pyridine, piperidine and pyrrole.

Book Suggested:

1. Morrison, R.T., Boyd, R.N., Organic Chemistry; 6th edition, Pubs: Prentice-Hall, 1992.
2. Wade Jr., L.G., Singh, M.S., Organic Chemistry; 6th edition, Pubs: Pearson Education, 2008.
3. Mukherji, S.M., Singh, S.P., Kapoor, R.P., Organic Chemistry; Pubs: Wiley Eastern Limited, 1985, Vol.I, II, III.
4. Solomons, T.W., Fryhle, C.B., Organic Chemistry; 9th edition, Pubs: Wiley India, 2007.
5. Carey, F.A., Organic Chemistry; 4th edition, Pubs: McGraw-Hill, 2000.
6. Streitwieser, A., Clayton, Jr., Heathcock, H., Introduction to Organic Chemistry; 3rd edition, Pubs: Macmillan Publishing Company, 1989.
7. Introduction to Organic Chemistry, Sireitwieser, Heathcock and Kosover, Macmilan.

Bachelor of Science (Medical and Non- Medical) SEMESTER–IV
SESSION: 2021-22
COURSE CODE: BSMM/BSNM-4084(P)
COURSE TITLE: CHEMISTRY PRACTICAL

Course outcomes:

Students will be able to analyze the given organic compound through

CO1:detection of elements (N, S and halogens) in organic compounds.

CO2:detection of functional groups (phenolic, carboxylic, carbonyl, esters, carbohydrates, amines,amides, nitro and anilide) in simple organic compounds

CO3: preparation of their derivatives

Bachelor of Science (Medical and Non- Medical) SEMESTER–IV
SESSION: 2021-22
COURSE CODE: BSMM/BSNM-4084(P)
COURSE TITLE: CHEMISTRY PRACTICAL

Duration: 3½ hrs. Max. Marks: 20

Instruction for practical examiner:Question paper is to be set on the spot jointly by the Internal and External Examiners. Two copies of the same should be submitted for the record to COE office, KanyaMahaVidyalaya, Jalandhar.

Qualitative Analysis

Detection of elements: N, S and halogens

Detection of functional groups:phenolic, carboxylic, carbonyl, esters, carbohydrates, amines, amides, nitro and anilide in simple organic compounds and preparing their derivatives.

Practical Examination

1) Detection of Elements, functional group and derivative preparation	15
2) Viva-Voce	03
3) Note Book	02

Book Suggested:

1. Experimental Organic Chemistry, Vol. I & II, P.R. Singh, D.S. Gupta and K.S. Bajpai, Tata McGraw Hill.
2. Laboratory Manual in Organic Chemistry, R.K. Bansal, Wiley Eastern.
3. Vogel's Textbook of Practical Organic Chemistry, B.S. Furniss, A.J. Hannaford, V. Rogers, P.W.G. Smith and A.R. Tatchell, ELBS.
4. Experiments in General Chemistry, C.N.R. Rao and U.C. Aggarwal, East-West Press.

Course Outcomes: Quantum Mechanics (Paper A)

Course code: BCSM-4395 (I)

After completing this course

CO1: Students will be familiar with the main aspects of the historical development of quantum mechanics

CO2: Students will understand the central concepts and principles in quantum mechanics

CO3: Students will be able to find the solution of Schrödinger wave equation for simple systems in one dimension and for Hydrogen atom.

CO4: Students will understand concept of X rays spectra and molecular spectra.

SEMESTER–IV
Session 2021-22
PHYSICS
Course code: BCSM-4395 (I)
PAPER–A
QUANTUM MECHANICS
(THEORY)

Time: 3 Hours **Marks: 30**
Pass Marks: 11

Instructions for the Paper Setters:
Eight questions of equal marks 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. Each question carries 6 marks.

Note: Students can use Non-Scientific calculators or logarithmic tables.

UNIT–I

Formalism of Wave Mechanics:
Brief introduction to need and development of quantum mechanics, photoelectric effect, Compton effect, Wave particle duality, De Broglie hypothesis, Wave packet, Group velocity, Uncertainty principle and its applications. Fundamental postulates of wave mechanics, Time dependent and time independent Schrodinger wave equation for a free particle and equation of a particle subject to forces. Stationary states, Superposition principle.

UNIT–II

Normalization and probability interpretation of wave function, Gaussian wave packet. Admissibility conditions of wave function, Eigen function and Eigen value, Expectation value, Operator and commutator formalism, Hermitian operator, orthogonal system, Probability current and conservation of probability, Ehrenfest theorem,.

UNIT–III

Problem in One and Three Dimensions:
Application of Schrodinger Equation for solving one dimensional Particle in a box, one dimensional potential step, Potential Barrier and Linear harmonic oscillator. Schrodinger equation for spherically symmetric potential for hydrogen atom. Spherical harmonics and their solution. Physical significance of quantum number, Degeneracy.

UNIT–IV

Production of X Rays and its properties, X-ray spectra, Moseley law, Absorption of X Rays, Auger effect, Molecular bonding of hydrogen molecule ion and hydrogen molecule, Molecular spectra, selection rules, Raman Effect.

Text Reference Books:

1. A Text book of Quantum Mechanics by P.M. Mathews and K. Venkatesan, (Tata McGraw Hill Pub., Co., Delhi) 2002.
2. Quantum Mechanics by J.L. Powell and B. Craseman (Narosa Pub. House, New Delhi) 1997.
3. Concepts of Modern Physics by Arthur Beiser (McGraw Hill Pub. Co., New Delhi, 9th Ed.)
4. 1995.
5. Elements of Modern Physics by S.H. Patil (McGraw Hill), 1998.
6. Quantum Mechanics by E. Merzbacher (John Wiley, 2nd Edition)
7. Fundamentals of Molecular Spectroscopy by C.N. Banwell (Tata McGraw Hill Pub. Co.,
8. Delhi), 2001.
9. Atomic Spectra by H.G. Kuhn (Longmans), 2nd Ed., 1969.
10. Introduction to Quantum Mechanic by L. Pauling and E.B. Wilson (Tata McGraw Hill Pub. Co., Delhi), 2002.
11. Quantum Mechanics by W. Greiner (Springer Verlag), 1994.
12. Fundamentals of Molecular Spectroscopy by C.B. Banwell-Tata McGraw Hill, 1986.
13. Molecular Spectroscopy: Jeanne L McHale.

Course Outcomes: PHY- ATOMIC SPECTRA & LASERS
Course Code: BCSM-4395 (II)

After passing this programme the students will be able to:

CO1: understand fine and hyperfine spectrum of hydrogen atom and the concept of spin of an electron

CO2: demonstrate understanding of exchange symmetry of wave function, different coupling schemes and spectra of atoms with more than one electron.

CO3: understand the fundamentals of lasers and its processes

CO4: have the knowledge of different components and types of lasers and its applications

SEMESTER–IV
Session 2021-22
PHYSICS
Course code: BCSM-4395 (II)
PAPER–B
ATOMIC SPECTRA & LASERS
(THEORY)

Time: 3 Hours Marks: 30

Pass Marks: 11

Instructions for the Paper Setters:
Eight questions of equal marks 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. Each question carries 6 marks.

Note: Students can use Non-Scientific calculators or logarithmic tables.

UNIT–I

One Electron Atomic Spectra:
Brief review of Bohr and Rutherford model of atom. Idea of vector model of atom and quantum numbers, Spectrum of Hydrogen atom, Line structure, electron spin, Stern Gerlach
experiment, spin orbit coupling, electron magnetic moment, total angular momentum, fine and Hyperfine structure of hydrogen atom, Lande g factor, Normal Zeeman effect, anomalous Zeeman effect.

UNIT–II

Many Electron System Spectra:
Exchange symmetry of wave function, Pauli's Exclusion principle, Electronic configuration and atomic states, shells, sub shells in atoms, Two valence electron atoms: LS and JJ coupling schemes and resulting spectral terms, optical spectra for one and many electron system(Helium), spectra of alkaline earth atoms.

UNIT–III

Laser Fundamentals:
Derivation of Einstein relations, Concept of stimulated emission and population inversion,
FauchberLedenberg formula, Threshold and Schawlow Tonnes condition, Components of laser devices and its types, three level and four level laser schemes, elementary theory of optical cavity.

UNIT–IV

Laser Systems:
Construction, mode of creating population inversion and output characteristics of Ruby laser, He-Ne laser, CO_2laser and Nd: YAG laser, applications of lasers–a general outline, Q-switching, Basics of holography.

Text Reference Books:
1. Introduction to Atomic Spectr by: H.E. White-Auckland McGraw Hill, 1934.

2. Spectroscopy Vol. I, II & III by Walker &Straughen
3. Introduction to Molecular Spectroscopy by G.M. Barrow-Tokyo McGraw Hill, 1962.
4. Spectra of Diatomic Molecules by Herzberg-New York, 1944
5. Introduction to Atomic Spectra by H.E. White (Mcgraw Hill, Book Co., Inc., New York)
6. Laser Fundamentals by W.T. Silfvast (Foundation Books), New Delhi, 1996
7. Laser and Non-Liner Optics by B.B. Laud (New Age Pub.) 2002
8. Laser, Svelto by (Plenum Pres) 3rd edition, New York

SEMESTER–IV
Session 2021-22
PHYSICS
Course Outcomes: PHY Lab Sem IV

Course code: BCSM-4395 (P)

CO1: The exercises included in this laboratory course are aimed at training the students to handle different type of equipment for verification of some of the laws and concepts studied in theory like concepts of thermodynamics, photoelectric effect and for carrying out precise measurements so that they develop confidence to use later the sophisticated instruments in their respective fields.

CO2: After the completion of this course students will be able to use spectrometer and hence will be able to study absorption spectra of iodine.

CO3: At the end of this course students will be able to prepare cane sugar solution and hence will be able to find its specific rotation by using polarimeter.

SEMESTER–IV
Sessio2021-22
PHYSICS
(PRACTICAL)
Course code: BCSM-4395 (P)

Instructions to Practical Examiner
Question paper is to be set on the spot jointly by the external and internal examiners. Two copies of the same to be submitted for the record to COE office, Kanya Maha Vidyalaya, Jalandhar

General Guidelines for Practical Examination
I. The distribution of marks is as follows: **Marks: 20**
i) One experiment **7 Marks**
ii) Brief Theory **3 Marks**
iii) Viva–Voce **5 Marks**
iv) Record (Practical file) **5 Marks**
II. There will be one sessions of 3 hours duration. The paper will have one session.
Paper will consist of 8 experiments out of which an examinee will mark 6 experiments and one of these is to be allotted by the external examiner.
III. Number of candidates in a group for practical examination should not exceed 12.
IV. In a single group no experiment is to be allotted to more than three examinees in any group.

List of Experiments
1. To study adiabatic expansion of gas and hence to calculate value of V.
2. To find the coefficient of Thermal Conductivity of a bad conductor by Lee's method.
3. To plot a calibration curve of a given thermocouple (copper constantan).
4. To study the photoelectric effect and determine the value of Planck's constant.
5. To determine the ionization potential of mercury.
6. Study of variation of light intensity with distance using photovoltaic cell
(Inverse Square Law)
7. To determine the heating efficiency of an electric kettle with varying voltage.
8. To study the absorption spectra of iodine vapours.
9. To study the rotation of plane of polarization by using polarimeter.
10. To determine the specific rotation of sugar using Laurent's half shade polarimeter
11. To study the characterizations of Photovoltaic cell.

Bachelor of Arts/ Bachelor of Science (Economics, Non-Medical, Computer Science) Semester–V

Session: 2021-22
Course Title: Mathematics (Dynamics)

Course Code: BARM /BECM / BCSM/ BSNM-5333(I)

Course Outcomes

After passing this course, the students will be able to:

CO 1: Identify the basic relations between distance, time, velocity and acceleration.

CO 2: Explain the relationship between forces and motion. Differentiate between balanced and unbalanced forces and Explain how unbalanced force affect motion.

CO 3: Understand Newton's Laws of Motion and Apply the laws to solve many problems.

CO 4: Discuss the motion of particles connected by a string, motion along a smooth inclined plane.

CO 5: Solve different types of problems with Variable Acceleration.

CO 6: Discuss Simple Harmonic Motion and Illustrate it with a variety of examples.

CO 7: Solve Pendulum, Damped and forced Oscillations oscillating system problems.

CO 8: Define Work, Power and Energy and Explain their relationship. Use measurement tools to apply the concepts of Work and power to solve real life problems.

CO 9: Define Energy and Identify the different types that exist

Bachelor of Arts/ Bachelor of Science (Economics, Non-Medical, Computer Science) Semester–V

Session: 2021-22
Course Title: Mathematics (Dynamics)

Course Code: BARM /BECM / BCSM/ BSNM-5333(I)

Examination Time:3 Hours Max.Marks: 50

Theory:40

CA:10

Instructions for the paper setter:

Eight questions of equal marks (8 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. The question paper must contain 30% of the article/theory from the syllabus.

Unit-I

Rectilinear motion in a straight line with uniform acceleration, Newton's laws of motion.Motion of two particles connected by a string.

Unit-II

Motion along a smooth inclined plane.Variableacceleration.Simple Harmonic Motion.

Unit-III

Curvilinear motion of particle in a plane, Definition of velocity and acceleration, projectiles, velocity and direction of motion of a projectile after a given time, projectiles on an inclined plane. Oscillations: Free Vibrations, Simple Pendulum, Conical Pendulum.

Unit-IV

Work, Power and Energy: Kinetic and Potential energy, Conservative forces. Theorem of conservation of energy.Work done against gravity.

Text Book:

S.R.Gupta: A text book of Dynamics

Reference Books:

1. F. Chorlton: Dynamics.

2. S.L. Loney: An Elementary Treatise on the Dynamics of a Practice and of Rigid Bodies, Cambridge University Press, 1956.

Bachelor of Arts/ Bachelor of Science (Economics, Non-Medical, Computer Science) Semester–V

Session: 2021-22
Course Title: Mathematics (Number Theory)

Course Code: BARM/ BECM/ BCSM/ BSNM-5333(II)

Course Outcomes

Successful completion of this course will enable the students to:

CO 1: Prove results involving divisibility and greatest common divisors.

CO 2: Solve system of linear congruences.

CO 3: Find solutions of specified linear Diophantine equation.

CO 4: Apply Fermat's and Euler's theorem to prove relation involving prime numbers.

CO 5: Apply the Wilson's theorem to solve numerical problems.

CO 6: Solve system of equations using congruences.

CO 7: Understand and apply properties of phi functions in real world problems.

CO 8: Understand application of important arithmetic functions.

Bachelor of Arts/ Bachelor of Science (Economics, Non-Medical, Computer Science) Semester–V

Session: 2021-22
Course Title: Mathematics (Number Theory)

Course Code: BARM/ BECM/ BCSM/ BSNM-5333(II)

Examination Time: 3 hrs. Max.Marks: 50

Theory: 40

CA:10

Instructions for the Paper Setter:

Eight questions of equal marks (8 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. The question paper must contain 30% of the article/theory from the syllabus.

Unit-I

The division algorithm, The greatest common divisor, least common multiple, The Euclidean algorithm.

Unit-II

The Diophantine equation ax + by = c, Prime numbers and their distribution, the fundamental theorem of arithmetic, Basic properties of congruences.

Unit-III

Linear congruences, Special divisibility tests, Chinese remainder theorem, The Fermat's theorem, Wilson's theorem

Unit-IV

Euler’s Phi function, Euler's theorem, some properties of the Phi Function, σ and τ functions, Mobius Inversion formula, Greatest integer function

Text Book:

D. Burton: Elementary Number Theory, Sixth Edition, McGraw-Hill. (Scope in Chapters 2-5, 7) 2005.

Reference Book:

Niven and Zuckerman: An Introduction to Number Theory, Wiley 1972.

Bachelor of Science (Medical & Non-Medical) SEMESTER–V
SESSION: 2021-22
COURSE CODE: BSMM/BSNM-5084
INORGANIC CHEMISTRY–I
(THEORY)

Course outcomes

Students will be able to:

CO1: understand structure and bonding in molecules / ions and predict the structure of molecules / ions.

CO2: use Crystal Field Theory to understand the structure, hybridisation, geometry and predict the colour of the complexes.

CO3: describe the stability of metal complexes by the use of formation constants and to calculate thermodynamic parameters from them.

CO4: to describe the magnetic properties of coordination compounds.

CO5: familiar with applications of coordination compound.

CO6: to draw Orgel diagrams for d^1 to d^{10} systems and predict the possible transitions.

CO7: to calculate number of microstate and ground state term symbols. CO8: understand preparations, properties and applications of alkyls aryls of lithium and aluminium, bonding in metal-ethylenic complexes, mechanism of homogeneous hydrogenation.

Bachelor of Science (Medical & Non-Medical) SEMESTER–V
SESSION: 2021-22
COURSE CODE: BSMM/BSNM-5084
INORGANIC CHEMISTRY–I

(THEORY)

Time: 3 Hrs. Max. Marks: 30

Instructions for the Paper Setters:

Eight questions of equal marks (6 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

1.Metal-ligand Bonding in Transition Metal Complexes Limitations of valence bond theory, an elementary idea of crystal-field theory, crystal field splitting in octahedral, tetrahedral and square planar complexes, factors affecting the crystal-field parameters.

Unit-II

2. Magnetic Properties of Transition Metal Complexes Types of magnetic behaviour, methods of determining magnetic susceptibility, spin-only formula. L-S coupling, correlation of μ_s and μ_{eff} values, orbital contribution to magnetic moments, application of magnetic moment data for characterization of 3d-metal complexes.

3. Thermodynamic and Kinetic Aspects of Metal Complexes
A brief outline of thermodynamic stability of metal complexes and factors affecting the stability, substitution reactions of square planar complexes.

Unit-III

4. Electronic Spectra of Transition Metal Complexes Term Symbols for p^2& d^2 systems, spectroscopic ground states for d^1-d^{10} electronic configurations. Types of electronic transitions, selection rules for d-d transitions, spectroscopic ground states, Orgel diagram for d^1-d^5.

Unit-IV

5. Organometallic Compounds Definition, nomenclature and classification of organometallic compounds. EAN rule, preparation, properties, and applications of alkyls aryls of lithium and aluminium, bonding in metal-ethylenic complexes, Mechanism of homogeneous hydrogenation reactions.

Books Suggested:

1. Cotton, F.A., Wilkinson, G., Gaus, P.L., Basic Inorganic Chemistry; 3rd edition, Pubs: John Wiley Sons. 1995. 2. Lee, J.D., Concise Inorganic Chemistry; 4th edition, Pubs: Chapman Hall Ltd., 1991.
3. Shriver, D.E., Alkins, P.W., Langford, C.H., Inorganic Chemistry; 4th edition, Oxford Publisher: Oxford University Press, 2006.
4. Porterfield, W.W., Wesley, A., Inorganic Chemistry; Pubs: Addison-Wesley Publishing Company, 1984. 5 .Miessler, G.L., Larr, D.A., Inorganic Chemistry; 3rd edition, Pubs: Pearson Education Inc., 2004.
6. Puri, B.R., Sharma, L.R., Kalia, K.C., Principles of Inorganic Chemistry; 30th edition, Pubs: Milestones Publisher, 2006-07.

Bachelor of Science (Medical & Non-Medical) SEMESTER–V
SESSION: 2021-22
COURSE CODE: BSMM/BSNM-5084
PHYSICAL CHEMISTRY–II(THEORY)

Course outcomes:

Students will be able to:

CO1: get knowledge about various electrochemical phenomena.

CO2: get the theoretical knowledge of the various spectroscopic methods on the basis of the examples from the science and industry.

CO3: use spectroscopic equipment such as MS, IR, NMR spectrometers.

CO4: identify organic compounds by analysis and interpretation of spectral data.

CO5: explain common terms in NMR spectroscopy such as chemical shift, coupling constant, and anisotropy and describe how they are affected by molecular structure.

CO6: identify and define various types of nuclear transmutation including fission, fusion and decay reactions.

CO7: define binding energy and mass defect and be able to calculate each for a given nucleus.

CO8: understand and explain the concept of ionizing radiation and distinguish between the three different types of radiation.

CO9: understand the concept of rate of change and half-life in the context of nuclear decay.

CO10: understand the basics of nuclear chemistry applications.

CO11: identify an oxidation – reduction (redox) reaction based on changes in oxidation numbers across the chemical change.

CO12: recognize degrees of reactivity based on an activity series table or a standard reduction potential table.

CO13: describe fully the relationship between the free energy and the cell potential.

CO14: explain thermodynamically the operation of a concentration cell and be able to predict the concentration in the cell based on the cell potential.

Bachelor of Science (Medical & Non-Medical) SEMESTER–V
SESSION: 2021-22
COURSE CODE: BSMM/BSNM-5084
PHYSICALCHEMISTRY–II

(THEORY)

Time: 3 Hrs. Max. Marks: 30

Instructions for the Paper Setters:

Eight questions of equal marks (6 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

1. Electrochemistry-I

Electrical transport-conduction in metals and in electrolyte solutions, specific conductance and equivalent conductance, measurement of equivalent conductance, variation of equivalent and specific conductance with dilution, migration of ions and Kohlrausch law, Arrhenius theory of electrolyte dissociation and its limitations, weak and strong electrolytes, Ostwald's dilution law, its uses and limitations. Debye-Huckel-Onsager's equation for strong electrolytes (elementary treatment only). Transport number, definition and determination by Hittorf method and moving boundary method. Applications of conductivity measurements: determination of degree of dissociation, determination of K_a of acids, determination of solubility product of a sparingly soluble salt, conductometric titrations.

Unit-II

2. Electrochemistry – II

Types of reversible electrodes-gas metal ion, metal ion, metal insoluble salt-anion and redox electrodes. Electrode reactions. Nernst equation, derivation of cell E.M.F. and single electrode potential, standard hydrogen electrode, reference electrodes, standard electrode potential, sign conventions, electrochemical series and its significance. Electrolytic and Galvanic cells -reversible and irreverisible cells, conventional representation of electrochemical cells.

EMF of a cell and its measurements. Computation of cell. EMF, Calculation of thermodynamic quantities of cell reactions (ΔG, ΔH and K), polarization, over potential and hydrogen overvoltage. Concentration cells with and without transport, liquid junction potential, application of concentration cells, valency of ions, solubility product and activity coefficient, potentiometric titrations.Definition of pH and pK_a, determination of pH using hydrogen, quinhydrone and glass electrodes by potentiometric methods. Buffers-mechanism of buffer action, Henderson-Hazel equation, Hydrolysis of salts. Corrosion-types,

theories and methods of combating it.

Unit-III

3. Nuclear Chemistry Introduction: Radioactivity, Nuclear Structure, Size of Nucleus, Mass Defects and Binding Energy, Nuclear Stability, Nuclear Forces, Nuclear Spin and Moments of Nuclei, Nuclear Models, Nuclear Decay Processes, The Laws of Radioactive Decay, Soddy-Fajans Group Displacement Law, Rate of Nuclear Decay and Half Life Time (Kinetics of Radioactive Decay), Induced Nuclear Reactions, Types of Nuclear Processes, High Energy Nuclear Reactions, Nuclear Reaction Cross-Section, Artificial radioactivity, Detection and Measurement of Radioactivity, Nuclear Fission, Nuclear Fusion, Applications of Radioactivity.

Unit-IV

4. Spectroscopy

Introduction: Electromagnetic radiation, regions of the spectrum, basic features of different spectrometers, statement of the Born-Oppenheimer approximation, degrees of freedom.

5. Rotational Spectrum

Diatomic molecules. Energy levels of a rigid rotor (semiclassical principles), selection rules, spectral intensity, distribution using population distribution (Maxwell-Boltzmann distribution) determination of bond length, qualitative description of non-rigid rotor, isotope effect.

6. Vibrational Spectrum

Infrared spectrum: Energy levels of simple harmonic oscillator, selection rules, pure vibrational spectrum, intensity, determination of force constant and qualitative relation of force constant and bond energies, effect of anharmonic motion and isotope on the spectrum, idea of vibrational frequencies of different functional groups.

Raman Spectrum: Concept of polarizability, pure rotational and pure vibrational Raman spectra of diatomic molecules, selection rules.

7. Electronic Spectrum

Concept of potential energy curves for bonding and antibonding molecular orbitals, qualitative description of selection rules and Franck-Condon principle. Qualitative description of s, p, and n M.O., their energy levels and the respective transitions.

Books Suggested: -

1. Atkins, P., Paula, J.de, Atkins Physical Chemistry; 8th edition, Pubs: Oxford University Press, 2008.
2. Puri, B.R., Sharma, L.R., Pathania, M.S., Principles of Physical Chemistry; 43rd edition, Pubs: Vishal Publishing Co., 2008.
3. Barrow, G.M., Physical Chemistry; 6th edition, Pubs: McGraw Hill Companies Inc, 1996.
4. Berry, R.S., Rice, S.A., Ross, J., Physical Chemistry; 2nd edition, Pubs: Oxford University Press, 2000.
5. Albert, R.A., Silbey, R.J., Physical Chemistry; 1st edition, Pubs: John Wiley & Sons Inc., 1992.
6. Levine, I.N., Physical Chemistry; 5th edition, Pubs: Tata McGraw Hill Publishing Co. Ltd,2002.

Bachelor of Science (Medical & Non-Medical) SEMESTER–V
SESSION: 2021-22
COURSE CODE: BSMM/BSNM-5084(P)
CHEMISTRY PRACTICAL

Course outcomes:

Students will be able to

CO1: synthesize and analyse the coordination compounds

CO2: determine the end point of various conductometric titrations

CO3: know the principle and working of Abbe's Refractometer

CO4: determine the composition of unknown mixture of two liquids by refractive index measurements.

CO5: learn the technique of Rast's methods

CO6: learn phenomenon of adsorption of acetic acid and oxalic acid on charcoal

CO7: learn distribution coefficient of of iodine between CCl_4 and water

Bachelor of Science (Medical & Non-Medical) SEMESTER–V
SESSION: 2021-2122
COURSE CODE: BSMM/BSNM-5084(P)
CHEMISTRY PRACTICAL

Duration: 3½ Hrs. Max. Marks: 20

Instruction for practical examiner:Question paper is to be set on the spot jointly by the Internal and External Examiners. Two copies of the same should be submitted for the record to COE office, Kanya Maha Vidyalaya, Jalandhar.

(I) Synthesis and Analysis

(a) Preparation of Sodium trioxalatoferrate (III) (b) Preparation of Ni-DMG Complex
(c) Preparation of Copper tetrammine complex
(d) Preparation of cis-bisoxalatodiaquachromate (III) ion

(II) Physical Chemistry
(a) Conductometric Titrations
(i) Determine the end point of the following titrations by the conductometric methods.
Strong acid-Strong base
Strong acid-Weak base
Weak acid-Strong base
Weak acid-Weak base
(ii) Determine the composition of a mixture of acetic acid and the hydrochloric acid by conductometric titration.
(b) (i) Molecular Weight Determination of acetanilide, napthalane, using camphor as solvent **(Rast's methods).**
(ii) To determine the molecular weight of a polymer by viscosity measurements. **(c) Adsorption** (i)To study the adsorption of acetic acid oxalic/acid from aqueous solutions by charcoal.
(d) Phase Equilibria (i) To determine the distribution coefficient of iodine between CCl_4 and water.
(e) Refractometry
(i) Determination of refractive index of a liquid by Abbe refractometer, and hence the specific and molar refraction.
(ii) To determine the composition of unknown mixture of two liquids by refractive index measurements.
Practical Examination
1) Inorganic Synthesis 07
2) Physical experiment 08
3) Viva- Voce 03
4) Note Book 02

Books Suggested: -

1. Experimental Inorganic Chemistry, W.G. Palmer, Cambridge.

2. Handbook of preparative Inorganic Chemistry, Vol. I & II, Brauer, Academic Press.

3. Inorganic Synthesis, McGraw Hill.

4. Experiments in General Chemistry, C.N.R. Rao and U.C. Aggarwal, East-West Press

5. Experiments in Physical Chemistry, R.C. Das and B. Behra, Tata McGraw Hill.

6. Advanced Practical Physical Chemistry, J.B. Yadav, Goel Publishing House.

7. Advanced Experimental Chemistry, Vol. I, Physical, J.N. Guru and R. Kapoor, S. Chand & Co.

8. Selected Experiments in Physical Chemistry, N.G. Mukherjee, J.N. Ghosh & Sons.

9. Experiments Physical Chemistry, J.C. Ghosh, Bharati Bhavan.

Bachelor of Science (Semester System) (12+3 System of Education)
(Semester–V) (Session 2021-22)
PHYSICS (CONDENSED MATTER PHYSICS)
(THEORY)
Course code: BSNM-5395 (I) for B.Sc. (Non Medical)
BCSM-5395 (I) for B.Sc. (Computer Science)

Course Outcomes

After passing this course, students will be able to:

CO 1. Understand basics about crystal structures in solids, various types of crystal structure, unit cells and symmetry operations.

CO 2. Understand the experimental methods to determine crystal structures, reciprocal lattice, Brillioun zones and form factor.

CO 3. Understand the concept of lattice vibrations and role of phonons in determining specific heat of solids at low temperatures and models of specific heat.

CO 4. Build concept from free electron model to Kronig Penny model and its application to band theory to differentiate insulators, semiconductors and conductors.

Bachelor of Science (Semester System) (12+3 System of Education)
(Semester–V) (Session 2021-22)
PHYSICS (CONDENSED MATTER PHYSICS)
(THEORY)
Course code: BSNM-5395 (I) for B.Sc. (Non Medical)
BCSM-5395 (I) for B.Sc. (Computer Science)

Time: 3 Hours Max. Marks: 30 Pass Marks: 11

Instructions for the Paper Setters:

Eight questions of equal marks 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. Each question carries 6 marks.

Note: Students can use Non-Scientific calculators or logarithmic tables.

UNIT–I

Crystal structure, Symmetry operations for a two and three dimensional crystal, Two dimensional Bravais lattices, Three dimensional Bravais lattices, Basic primitive cells, Crystal planes and Miller indices, Diamond and NaCl structure.

UNIT–II

Crystal Diffraction: Bragg's law, Experimental methods for crystal structure studies, Laue equations, Reciprocal lattices of SC, BCC and FCC, Brag's law in reciprocal lattice, Brillioun zones and its construction in two and three dimensions, Structure factor and atomic form factor.

UNIT–III

Lattice vibrations, Concepts of phonons, Scattering of photons by phonons, Vibration and monoatomic, linear chains, Density of modes, Einstein and Debye models of specific heat. Free electron model of metals, Free electron, Fermi gas and Fermi energy.

UNIT–IV

Band Theory: Kronig Penney model, Metals and insulators, Conductivity and its variation with temperature in semiconductors, Fermi levels in intrinsic and extrinsic semiconductors, band gap in semiconductors.

Books Suggested:

1. Introduction to Solid State Physics by C. Kittel (Wiley Eastern)
2. Elements of Modern Physics by S.H. Patil (TMGH, 1985).
3. Solid State Physics by Puri and Babbar.
4. Condensed Matter Physics by T.S. Bhatia (Vishal Publishing Co.)

Bachelor of Science (Semester System) (12+3 System of Education)
(Semester–V) (Session 2021-22)
PHYSICS (ELECTRONICS)
Course code: BSNM-5395 (II) for B.Sc. (Non Medical)
BCSM-5395 (II) for B.Sc. (Computer Science)

Course Outcomes:
After completing this course a student will be able to
CO1: understand, concept of voltage and current sources, working of a p-n junction diode, zener diode, and their use in basic gates, photonic devices, rectification and voltage regulation.
CO2: understand the characteristics, biasing and working of BJT and FETs.
CO3: able to understand h-parameters, amplifiers using BJT & FETs and types of feedbacks and practical example of negative feedback (emitter follower).
CO4: understand LC and RC oscillators and their comparison.

Bachelor of Science (Semester System) (12+3 System of Education)
(Semester–V) (Session 2021-22)
PHYSICS (ELECTRONICS)
Course code: BSNM-5395 (II) for B.Sc. (Non Medical)
BCSM-5395 (II) for B.Sc. (Computer Science)
(THEORY)

Time: 3 Hours Marks: 30 Pass Marks: 11

Instructions for the Paper Setters:

Eight questions of equal marks 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. Each question carries 6 marks.

Note: Students can use Non-Scientific calculators or logarithmic tables.

UNIT–I

Concepts of current and voltage sources, p-n junction, Biasing of diode, V-I characteristics, Rectification: half wave, full wave rectifiers and bridge rectifiers, Efficiency, Ripple factor, Qualitative ideas of filter circuits (Shunt capacitor, L section and π filters), Zener diode and voltage regulation, Introduction to Photonic devices (construction and working of solar cell, photodiode and LED). Basic concepts of Boolean algebra, AND, OR ,NOT and NAND gates using diodes.

UNIT–II

Junction transistor : Structure and working relation between different currents in transistors, Sign conventions, Amplifying action, Different configurations of a transistor and their comparison, CB and CE characteristics, Structure and characteristics of JEFT, Transistor biasing and stabilization of operating point, Voltage divider biasing circuit.

UNIT–III

Working of CE amplifier, Amplifier analysis using h-parameters, Equivalent circuits, Determination of current gain, Power gain, Input impedance, FET amplifier and its voltage gain, Feed back in amplifiers, Different types, Voltage gain, Advantage of negative feed back, Emitter follower as negative feedback circuit.

UNIT–IV

Barkausen criterion of sustained oscillations, LC oscillator (tuned collector, tuned base Hartley), RC oscillators, Phase shift Oscillator and Wein bridge Oscillator

Books Suggested:

1. Basic Electronics and Linear Circuits by N.N. Bhargave, D.C. Kulshreshtha and S.C. Gupta.

2. Foundations of Electronics by D. Chatophadhyay, P.C. Rakshit, B. Saha and N.N. Purkit.

3. Basic Electronics by D.C. Tayal (Himalaya Pub.)

Bachelor of Science (Semester System) (12+3 System of Education)
(Semester–V) (Session 2021-22)
PHYSICS PRACTICAL
Course code: BSNM-5395 (P) for B.Sc. (Non Medical)
BCSM-5395 (P) for B.Sc. (Computer Science)

Course Outcomes : Physics Lab Sem V

CO 1. Students will be able to characterize p-n junction, zener diode, and their use as rectifier, filters, clipping element and to find energy gap.
CO 2. Student will be able to use CRO for AC voltage and frequency.
CO 3. Students will be able to characterize Common base and common emitter transistors and their use as amplifier.
CO 4. Students will be able to use diodes as basic gates.

Bachelor of Science (Semester System) (12+3 System of Education)
(Semester–V) (Session 2021-22)
PHYSICS PRACTICAL
Course code: BSNM-5395 (P) for B.Sc. (Non Medical)
BCSM-5395 (P) for B.Sc. (Computer Science)

Instructions to Practical Examiner
Question paper is to be set on the spot jointly by the external and internal examiners. Two copies of the same to be submitted for the record to COE office, Kanya MahaVidyalaya, Jalandhar

General Guidelines for Practical Examination

I. The distribution of marks is as follows: **Marks: 20**
i) One experiment **7 Marks**
ii) Brief Theory **3 Marks**
iii) Viva–Voce **5 Marks**
iv) Record (Practical file) **5 Marks**
II. There will be one sessions of 3 hours duration. The paper will have one session.
Paper will consist of 8 experiments out of which an examinee will mark 6 experiments and one of these is to be allotted by the external examiner.
III. Number of candidates in a group for practical examination should not exceed 12.
IV. In a single group no experiment is to be allotted to more than three examinees in any group.

LIST OF EXPERIMENTS-

1. Measurement of reverse saturation current in p-n-junction diode at various temperatures and to find the approximate value of energy gap.
2. To draw forward and reverse bias characteristics of a p-n junction diode.
3. To study working of CRO and its use to find AC signal voltage and its frequency.
4. Study of a diode as a clipping element.
5. To measure the efficiency and ripple factors for (a) halfwave (b) full wave and (c) bridge rectifier circuits.
6. To draw the characteristics of a Zener diode.
7. To study characteristics of Common Base transistor. and to find input resistance, output resistance, voltage gain and current gain.
8. To study characteristics of Common Emitter transistor. and to find h-parameters.
9. To study the gain of an amplifier at different frequencies and to find Band width
10. To study the reduction in the ripple in the rectified output with RC, LC and л filters.
11. To study logic gates (OR, AND, NOT and NAND).

Bachelor of Arts/Bachelor of Science (Economics/Computer Science/Non-Medical)

Semester–VI

Session- 2021-22

Course Title: Mathematics (Linear Algebra)

Course Code:BARM/BECM/BCSM/BSNM-6333(I)

Course Outcomes

After the completion of this course, students should be able to:

CO 1: Express the algebraic concepts such as binary operation, groups, rings and fields.

CO 2: Define a vector space and subspace of a vector space.

CO 3: Check the linear dependence and linear independence of vectors.

CO 4: Describe the concepts of basis and dimension of vector spaces.

CO 5: Investigate properties of vector spaces and subspaces using linear transformation.

CO 6: Express linear transformations between vector spaces.

CO 7: Perform algebra operations between linear transformations.

CO 8: Find the matrix representing a linear transformation.

Bachelor of Arts/Bachelor of Science (Economics/Computer Science/Non-Medical)

Semester–VI

Session: 2021-22

Course Title: Mathematics (Linear Algebra)

Course Code: BARM/BECM/ BCSM/BSNM-6333(I)

Examination Time: 3 Hours Max. Marks: 50

Theory:40

CA:10

Instructions for the paper setters/examiners:

Eight questions of equal marks (8 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

Definition of groups, rings and fields with examples. Definition of a vector space, subspaces with examples. Direct sum of subspaces.Linear span, Linear dependence, Linear independence ofvectors.Linear combination of vectors.

Unit-II

Basis of a vector space, Finitely generated vector spaces. Existence theorem for basis. Invariance ofthe number of elements of the basis set. Dimension of sum of two subspaces. Quotient space and its dimension.

Unit-III

Linear transformation.Algebra of linear transformation.Rank-Nullity theorem, Isomorphism and Isomorphic spaces.

Unit-IV

Matrix of a linear transformation. Changes of basis, Linear operator.

Text Book:

Charles W.Curtis : Linear Algebra

Reference Books:

1.Surjit Singh: Linear Algebra, Vikas Publishing ,1997.

2.V. Krishnamurthy, V. P. MainraandJ.L. Arora:An Introduction to Linear Algebra, East WestPress, 1976.

3.Shanti Narayan & P.K. Mittal: A Text Book of Matrices, 10th Edition (2002), S.Chand& Co.

Bachelor of Arts/Bachelor of Science (Economics/Computer Science/Non-Medical)

Semester–VI

Session: 2021-22

Course Title: Mathematics (Numerical Analysis)

Course Code: BARM/BECM/ BCSM/BSNM-6333(II)

After passing this course, the students will be able to:

CO 1. Perform computation for solving a system of equations.

CO 2. Understand its application in all branches of engineering.

CO 3. Know how to find the roots of transcendental equations.

CO 4. Learn how to interpolate the given set of values.

CO 5. Understand the curve fitting for various polynomials .

CO 6. Learn numerical solution of differential equations.

CO 7. Compute numerical integration and differentiation, numerical solution of ordinary differential equations.

Bachelor of Arts/Bachelor of Science (Economics/Computer Science/Non-Medical)

Semester–VI

Session: 2021-22

Course Title: Mathematics (Numerical Analysis)

Course Code: BARM/BECM/ BCSM/BSNM-6333(II)

Examination Time: 3 Hours Max. Marks: 50

Theory:40

CA:10

Instructions for the Paper Setter: Eight questions of equal marks(8 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.

The students can use only Non Programmable& Non Storage Type Calculator.

Unit-I

Error generation, propagation, error estimation and error bounds, Solution of non-linear equations, Bisection method, Iteration method, Newton's Method, Generalized Newton's Method, Method of false position, Muller's method, Rate of convergence of these methods.

Unit-II

Solution of linear system of equation; Direct method, Gauss elimination variant (Gauss Jordan and Crout reduction), Triangular Method, Iterative Method, Jacobi’s Method, Gauss Seidel Method. Finite Differences: Forward, Backward, Central, Divided differences, shift operator, relationship between the operators and detection of errors by use of difference operator. Interpolation with divided difference, Newton’s formula, Lagrangian Method.

Unit-III

Finite difference interpolation, Gauss formula, Stirling formula, Bessel's formula, Error Estimation Extrapolation. Numerical differentiation, Method based on interpolation. Numerical Integration, Trapezoidal rule, Simpson's rule, Weddle rule, Romberg Integration, Gaussian integration method, Gaussian legendre integration. Double numerical integration.

Unit-IV

Numerical solution of ordinary differential equations, Initial value problem, Taylor's method, Euler's methods, Picard's method, Milne's Method, Runge-KuttaMethod.Predictor- Corrector's Method.

Text Book:

Iyenger, S. R. K., R. K. Jain, and MahinderKumar.Numerical Methods for Scientific and Engineering Computation. Delhi: New Age International Publishers, 2012.

Bachelor of Science (Medical and Non- Medical) SEMESTER-VI
SESSION: 2021-22
COURSE CODE: BSMM/BSNM-6084(I)
COURSE TITLE: ORGANIC CHEMISTRY–I (THEORY)

Course outcomes:

Students will be able to

CO1:learn about the Principle and applications of ultraviolet and Woodward Fisher Rule

CO2: understand the infra-red spectroscopy in organic structure determination

CO3:know about the Nuclear magnetic resonance spectroscopy,proton chemical shift,spin-spin coupling, coupling constants and applications to organic structures

CO4: learn about the different mechanisms involved in the polymer preparation

CO5: learn about the different polymerization techniques

CO6:Familiarize with structure, classification and the biological functioning of carbohydrates,amino acids and nucleic acids.

CO7:understand the types and reactions given by organosulphur compounds

Bachelor of Science (Medical and Non- Medical) SEMESTER–VI
SESSION: 2021-22
COURSE CODE: BSMM/BSNM-6084(I)
COURSE TITLE: ORGANIC CHEMISTRY–I (THEORY)

Time: 3 Hrs. Max. Marks: 30

Note:Instructions for the Paper Setter

Eight questions of equal marks (6 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

1. Spectroscopy (5 Hrs)

Nuclear Magnetic Resonance (NMR) spectroscopy,Proton Magnetic Resonance (1H NMR) spectroscopy, nuclear shielding and deshielding, chemical shift and molecular structure, spin-spin splitting and coupling constants, areas of signals, interpretation of PMR spectra of simple organic molecules such as ethyl bromide, ethanol, acetaldehyde, 1,1,2-tribromoethane, ethyl acetate, toluene and acetophenone.

2. Electromagnetic Spectrum: Absorption Spectroscopy (5 Hrs)

Ultraviolet (U.V.) absorption spectroscopy introduction- (Beer-Lambert law), molar absorptivity, analysis of UVspectra, types of electronic transitions effect of conjugation.Conceptofchromophores and auxochrome, Bathochrome, hypsochrome, hyperchrome, hypochromic shifts-UVspectra of conjugated compounds

UNIT–II

Electromagnetic Spectrum: Absorption Spectroscopy (3 Hrs)

Infrared (IR) Absorption spectroscopy-introduction, Hooke's law, Selection rules, intensity and IR bands, measurement of IR spectrum time characteristic absorptionof various fundamental band interpretation of IR spectra of simple organic compounds.

3. Problems based on spectroscopy (4 Hrs)

Problems pertaining to the structure elucidation of simple organic compounds using UV, IR and PMR spectroscopic techniques.

4. Organosulphur Compounds **(3 Hrs)**

Nomenclature, structural features, Methods of formation and chemical reactions of thiols, thioethers,sulphonic acids, sulphonamides and sulphaguanidine.

UNIT-III

5. Synthetic Polymers **(6 Hrs)**

Addition or chain-growth polymerization. Free radical vinyl polymerization, ionic vinyl polymerization, Ziegler-Natta polymerization and vinyl polymers.Condensation or step growth polymerization. Polyesters, polyamides, phenol formaldehyde resins, urea formaldehyde resins, epoxy resins and polyurethanes.Natural and synthetic rubbers.

6. Organic Synthesis *via* Enolates **(6 Hrs)**

Acidity of α-hydrogens, alkylation of diethyl malonate and ethyl acetoacetate. Synthesis of ethyl acetoacetate: the Claisen condensation. Keto-enol tautomerism of ethyl acetoacetate.Alkylation of 1,3-dithianes. Alkylation and acylation of enamines.

UNIT–IV

7. Carbohydrates **(7 Hrs)**

Classification and nomenclature. Monosaccharides, mechanism of osazone formation, interconversion of glucose and fructose, chain lengthening and chain shortening of aldoses. Configuration of monosaccharides.Erythro and threodiastereomers.Conversion of glucose into mannose.Formation of glycosides, ethers and esters. Determination of ring size of monosaccharides.Cyclic structure of D(+)-glucose. Mechanism of mutarotation.

Structures of ribose and deoxyribose

An introduction to disaccharides (maltose, sucrose and lactose) and polysaccharides (starch and cellulose) without involving structure determination.

8. Amino Acids, Peptides, Proteins and Nucleic Acids **(6 Hrs)**

Classification, structure and stereochemistry of amino acids.Acid-base behaviour, isoelectric pointandelectrophoresis.Preparationand reactions of α-amino acids.Structure and nomenclature of peptides and proteins.Classification of proteins. Peptide structure determination, end group analysis, selective hydrolysis of peptides. Classical peptide synthesis, solid-phase peptide synthesis.Structures of peptides and proteins.Levels of protein structure.Proteindenaturation/renaturation.Nucleic acids : Introduction. Constituents of nucleic acids.Ribonucleosides and ribonucleotides.Thedouble helical structure of DNA.

Books Suggested :

1. Spectrometric Identification of Organic Compoundsby Robert M. Silverstein, Francis X. Webster , David J. Kiemle, David L. Bryce ; Publisher:Wiley, 1981

2. Morrison, R.T., Boyd, R.N., Organic Chemistry; 6th edition, Pubs: Prentice-Hall, 1992.

3. Wade Jr., L.G., Singh, M.S., Organic Chemistry; 6th edition, Pubs: Pearson Education, 2008.

4. Mukherji, S.M., Singh, S.P., Kapoor, R.P., Organic Chemistry; Pubs: New Age International, 1985, Vols.I, II, III.

5. Carey, F.A., Organic Chemistry; 4th edition, Pubs: McGraw-Hill, 2000.

6. Solomons, T.W., Fundamentals of Organic Chemistry; 5th edition, Pubs: John Wiley & Sons, 1997.

7. Streitwieser, A., Clayton, Jr., Heathcock, H., Introduction to Organic Chemistry; 3rd edition, Pubs: Macmillan Publishing Company, 1989.

Bachelor of Science (Medical and Non- Medical) SEMESTER–VI
SESSION: 2021-22
COURSE CODE: BSMM/BSNM-6084(II)
COURSE TITLE: PHYSICAL CHEMISTRY–II(THEORY)

Course outcomes:

Students will be able to

CO1: understand wave mechanics in three dimensions;

CO2: describe the structure of the hydrogen atom and show an understanding of quantisation of angular momentum.

CO3: understand and explain the differences between classical and quantum mechanics

CO4: understand the idea of wave function

CO5: understand the uncertainty relations

CO6: solve Schroedinger equation for simple potentials

CO7: spot, identify and relate the eigen value problems for energy, momentum, angular momentum and central potentials explain the idea of spin

CO8: apply the knowledge about photochemical and photophysical processes

CO9: acquire knowledge about the unit cell, space lattice, miller indices, symmetry operations , Bragg equation etc.

Bachelor of Science (Medical and Non- Medical) SEMESTER–VI
SESSION: 2021-22
COURSE CODE: BSMM/BSNM-6084(II)
COURSE TITLE: PHYSICAL CHEMISTRY–II(THEORY)

Time: 3 Hrs. Max. Marks: 30

Note:Instructions for the Paper Setter

Eight questions of equal marks (6 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

1. Quantum Mechanics-I (12 Hrs)

Black-body radiation, Planck's radiation law, Photoelectric effect, heat capacity of solids, Bohr's model of hydrogen atom (no derivation) and its defects, Compton effect. de Broglie hypothesis, Heisenberg's uncertainty principle, Sinusoidal wave equation, Hamiltonian operator, Schrodinger wave equation and its importance, physical interpretation of the wave function, postulates of quantum mechanics, particle in a one dimensional box, quantization of energy levels, extension to two and three dimensional boxes, degeneracy.

UNIT–II

2. Quantum Mechanics-II (12 Hrs)

Simple harmonic oscillator model of vibrational motion, setting up Schrodinger equation and discussion of solution and wave functions. Rigid rotator model of rotation of diatomic molecules transformation to spherical polar coordinates spherical harmonics and their discussion. Qualitative investigation H-atom, setting up Schrodinger equation, radial and angular part, radial distribution functions of 1s, 2s, 2p, 3s, 3p and 3d.

UNIT–III

3. Solid State **(10 Hrs)**

Definition of space lattice and unit cell, Law of crystallography- (i) Law of constancy of interfacial angles, (ii) Law of rationality of indices, (iii) Symmetry elements in crystals. X-ray diffraction by crystals.Derivation of Bragg's Law in Reciprocal space.Determination of crystal structure of NaCl, KCl by use of Powder method; Laue's method.

UNIT-IV

4. Photochemistry **(11Hrs)**

Interaction of radiation with matter, difference between thermal and photochemical processes. Laws of photochemistry: Grothus–Drapper law, Stark–Einstein law, Jablonski diagram depicting various processes occurring in the excited state, qualitative description of flourescence, phosphorescence, non–radiative processes (internal conversion, intersystem crossing), quantum yield, photosensitized reactions–energy transfer processes (simple examples).

Books Suggested :

1. Atkins, P., Paula, J.de, Atkins, Physical Chemistry; 8th edition, Pubs: Oxford University Press, 2008.
2. Puri, B.R., Sharma, L.R., Pathania, M.S., Principles of Physical Chemistry; 43rd edition, Pubs: Vishal Publishing Co., 2008.
3. Barrow, G.M., Physical Chemistry; 6th edition, Pubs: McGraw Hill Company Inc., 1996.
4. Rao, C.N.R., University General Chemistry; Pubs: Macmillan of India, 1985.
5. Berry, R.S., Rice, S.A., Ross, J., Physical Chemistry; 2nd edition, Pubs: Oxford University Press, 2000.
6. Albert, R.A., Silbey, R.J., Physical Chemistry; I edition, Pubs: John Wiley & Sons Inc., 1992.
7. Dogra, S.K., Dogra, S., Physical Chemistry Through Problems, Pubs: Wiley Eastern Ltd., 1991.
8. Levine, I.N., Physical Chemistry; 5th edition, Pubs : Tata McGraw Hill Publishing Co. Ltd., 2002.
9. Moore, W.J., Basic Physical Chemistry; Pubs : Prentice Hall of India Pvt. Ltd., 1983.
10. Metz, C.R., Theory and Problems of Physical Chemistry; Schaum's outline series, 2nd edition, Pubs:McGraw-Hall Book Company, 1989.
11. Banwell, C.N., McCash, E.M., Fundamentals of Molecular Spectroscopy; 4th edition, Pubs: Tata McGraw Hill Publishing Co. Ltd., 1999.
12. Atkins, P. Friedman, R., Molecular Quantum Mechanics; 4th edition Pubs: Oxford University Press, 2007.
13. Levine, I.N., Quantum Chemistry; 5th edition, Pubs: Prentice Hall International Inc., 2000.
14. Inorganic Chemistry, W.W. Porterfield Addison-Wesley.
15. Inorganic Chemistry, A.G. Sharpe, ELBS.

Bachelor of Science (Medical and Non- Medical) SEMESTER–VI
SESSION: 2021-22
COURSE CODE: BSMM/BSNM-6084(P)
COURSE TITLE: CHEMISTRY PRACTICAL

Course outcomes:

Students will be able to

CO1:separate the various mixtures by Column Chromatography technique

CO2:synthesize different Organic Compounds

CO3:synthesise the different compounds by Green Approach

CO4:prepare the different dyes

Bachelor of Science (Medical and Non- Medical) SEMESTER–VI
SESSION 2021-22
COURSE CODE: BSMM/BSNM-6084(P)
COURSE TITLE: CHEMISTRY PRACTICAL

Duration: 3½ hrs. Max. Marks: 20

Instruction for practical examiner:Question paper is to be set on the spot jointly by the Internal and External Examiners. Two copies of the same should be submitted for the record to COE office, KanyaMahaVidyalaya, Jalandhar.

(I) Organic Chemistry Laboratory Techniques

(a) Column Chromatography

Separation of o & p nitrophenol

Separation of Leaf pigments from Spinnach leaves

Separation of o & p nitro aniline

Separation of dyes.

(b) Synthesis of Organic Compounds

Preparation of p-nitroacetanilide

Preparation of p-bromoacetanilide

Green Chemistry Experiment: Preparation of benzilic acid from Benzyl-using green

approach.

Preparation of Methyl Orange, Methyl Red

Preparation of benzilic acid from benzyl-using green approach

Practical Examination

1) Column Chromatography= 07

2) Organic Synthesis =06

3) Viva-Voce =04

4) Note Book= 03

Books suggested:

1. Experimental Organic Chemistry, Vol. I & II, P.R. Singh, D.S. Gupta and K.S. Bajpai, Tata McGraw Hill.

2. Laboratory Manual in Organic Chemistry, R.K. Bansal, Wiley Eastern.

3. Vogel's Textbook of Practical Organic Chemistry, B.S. Furniss, A.J. Hannaford, V. Rogers, P.W.G. Smith and A.R. Tatchell, ELBS.

4. Experiments in General Chemistry, C.N.R. Rao and U.C. Aggarwal, East-West Press.

Bachelor of Science (Semester System) (12+3 System of Education)
(Semester–VI) (Session 2021-22)
PHYSICS (NUCLEAR PHYSICS)
(THEORY)
Course code: BSNM-6395 (I) for B.Sc. (Non Medical)
BCSM-6395 (I) for B.Sc. (Computer Science)

Course Outcomes

After passing this course, students will be able to:

CO 1. Understand basic properties of nucleus and nuclear forces.

CO 2. Understand about radioactivity, theories of alpha, beta and gamma decay, neutrino hypothesis.

CO 3.Understand concepts and types about nuclear reactions, reactions cross section and compound nucleus.

CO 4. Understand nuclear models (Liquid drop and Shell model) and their failures and successes.

Bachelor of Science (Semester System) (12+3 System of Education)
(Semester–VI) (Session 2021-22)
PHYSICS (NUCLEAR PHYSICS)
(THEORY)
Course code: BSNM-6395 (I) for B.Sc. (Non Medical)
BCSM-6395 (I) for B.Sc. (Computer Science)

Time: 3 Hours Marks: 30 Pass Marks: 11

Instructions for the Paper Setters:

Eight questions of equal marks 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. Each question carries 6 marks.

Note: Students can use Non-Scientific calculators or logarithmic tables.

UNIT–I

Nuclear Properties: Constituents of nucleus, non-existence of electrons in nucleus, Nuclear mass and binding energy, features of binding energy versus mass number curve, nucleus radius, angular momentum and parity, nuclear moments: magnetic dipole moment and electric quadruple moment, properties of nuclear forces, Yukawa theory.

UNIT–II

Radioactive Decays: Modes of decay of radioactive nuclides and decay Laws, radioactive series and displacement law, radioactive dating, Alpha decay: Gamow's theory of alpha decay, barrier penetration as applied to alpha decay, Geiger Nuttal law, Beta decays: β-, β+ and electron capture decays, Neutrino hypothesis and its detection, parity violation in β decay, Gamma transitions, internal conversion.

UNIT–III

Nuclear Reactions: Types of nuclear reactions, reactions cross section, conservation laws, Kinematics of nuclear reaction, examples of nuclear reactions: proton, deuteron, alpha particle, neutron and photon induced reactions. Q-value and its physical significance, Compound nucleus

UNIT–IV

Nuclear Models: Liquid drop model, semi-empirical mass formula, condition of stability, evidence for nuclear magic numbers, Shell Model, energy level scheme, angular momenta of nuclear ground states, parity and magnetic moment of nuclear ground states.

Reference Books:

1. Basic Ideas and Concepts in Nuclear Physics by K. Hyde
2. Introduction to Nuclear Physics by H.A. Enge
3. Nuclear Physics by I. Kaplan (Addison Wesley)
4. Nuclei and Particles by E. Segre

Bachelor of Science (Semester System) (12+3 System of Education)
(Semester–VI) (Session 2021-22)
PHYSICS (RADIATION AND PARTICLE PHYSICS)
Course code: BSNM-6395 (II) for B.Sc. (Non Medical)
BCSM-6395 (II) for B.Sc. (Computer Science)

Course Outcome:

After successfully completing this course a student will be able to:

CO1: understand interaction of radiation and charged particles with matter.

CO2: understand theory and working of various types of nuclear detectors like gas filled, semiconductor, solid state track detectors and nucleus emulsions.

CO3: understand theory and working of various particle accelerators, linear and cyclic and phase stability conditions.

CO4: understand about elementary particles, different types of interactions and quark mode.

Bachelor of Science (Semester System) (12+3 System of Education)
(Semester–VI) (Session 2021-22)
PHYSICS (RADIATION AND PARTICLE PHYSICS)
Course code: BSNM-6395 (II) for B.Sc. (Non Medical)
BCSM-6395 (II) for B.Sc. (Computer Science)

(THEORY)

Time: 3 Hours Marks: 30 Pass Marks: 11

Instructions for the Paper Setters:

Eight questions of equal marks 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. **Each question carries 6 marks.**

Note: Students can use Non-Scientific calculators or logarithmic tables.

UNIT–I

Interaction of Radiation and Charged Particles with Matter: Derivation of Bethe-Bloch formula,Stopping power and range of heavy charged particles, Energy loss of electrons andpositrons, Positrons annihilation, interaction of gamma rays with matter.

UNIT–II

Nuclear Radiation Detection: Gas-filled detectors, Proportional and Geiger-Muellercounters, Scintillation detectors, Semiconductor detectors,Cherenkov effect,Solid state nucleartrack detectors. Bubble chamber.

UNIT–III

Accelerators: Linear accelerators, Cyclic accelerators: Cyclotron, Synchrocyclotron, Betatron, Electron and proton synchrotron, Colliding beam machines: introduction to Large Hadron Collider

UNIT–IV

Elementary Particles: Historical introduction,high energyphysics units, fermions and bosons, particles andantiparticles, Classification of particles, types of interactions, electromagnetic, weak, stronginteractions, gravitational interactions, Quantum numbers and conservation laws: Charge, Baryon number, lepton number, parity, isospin, chargeconjugation, strangeness. Introduction to quarks and qualitative discussion of the quark model,

Reference Books:

1. Basic Ideas and Concepts in Nuclear Physics by K. Hyde
2. Introduction to Nuclear Physics by H.A. Enge
3. Nuclear Physics by I. Kaplan (Addison Wesley)
4. Nuclei and Particles by E. Segre
5. Introduction to High Energy Physics by D.H. Perkins
6. Elementary Particles by I.S. Hughes

Bachelor of Science (Semester System) (12+3 System of Education)
(Semester–VI) (Session 2021-22)
PHYSICS PRACTICAL
Course code: BSNM-6395 (P) for B.Sc. (Non Medical)
BCSM-6395 (P) for B.Sc. (Computer Science)

Course Outcome:After successfully completing this course a student will be able to:

CO1: understand magnetic parameters and phenomenon of hysteresis and tracing of B-H curve.
CO2: understand application of zener diode as voltage regulators.
CO3: understand the characteristics and working of FET& LDR and response of RC circuits.
CO4: use of GM counter to understand the concepts of dead time and absorption coefficient and statistical fluctuations.

Bachelor of Science (Semester System) (12+3 System of Education)
(Semester–VI) (Session 2021-22)
PHYSICS PRACTICAL
Course code: BSNM-6395 (P) for B.Sc. (Non Medical)
BCSM-6395 (P) for B.Sc. (Computer Science)

Instructions to Practical Examiner
Question paper is to be set on the spot jointly by the external and internal examiners. Two copies of the same to be submitted for the record to COE office, KanyaMahaVidyalaya, Jalandhar

General Guidelines for Practical Examination

I. The distribution of marks is as follows: **Marks: 20**
i) One experiment **7 Marks**
ii) Brief Theory **3 Marks**
iii) Viva–Voce **5 Marks**
iv) Record (Practical file) **5 Marks**
II. There will be one sessions of 3 hours duration. The paper will have one session.
Paper will consist of 8 experiments out of which an examinee will mark 6 experiments andone of these is to be allotted by the external examiner.
III. Number of candidates in a group for practical examination should not exceed 12.
IV. In a single group no experiment isto be allotted to more than three examinees in any group.

LIST OF EXPERIMENTS-

1. To trace the B-H curves for different materials using CRO and find the magnetic parameters from these.
2. To study the stabilization of output voltage of a power supply with Zener diode.
3. To draw output and mutual characteristics of an FET (Experiments) and determine itsparameters.
4. To set up an oscillator and to study its output on CRO for different C values.
5. To draw the plateau of a GM counter and find its dead time.
6. To study the statistical fluctuations using GM counter.
7. To study the absorption of beta particles in aluminium using GM counter and determine the absorption coefficient of beta particles from it.
8. To study the characteristics of a thermistor and find its parameters.
9. To study the response of RC circuit to various input voltage (square, sine and triangular).
10. To study characteristics of LDR.