SCHEME OF EXAMINATION
& SYLLABUS
of
B.Sc. (PCM)

Semester Exam

UNDER

FACULTY OF SCIENCES

B.Sc. (PCM)				
First Semester				
Code No.	**Subject**	**Internal Marks**	**External Marks**	**Total**
BPCM101	English –I	30	70	100
BPCM102	Algebra And Trigonometry	30	70	100
BPCM103	Vector Analysis And Geometry	30	70	100
BPCM104	Physical Chemistry	30	70	100
BPCM105	MECHANICS AND OSCILLATIONS	30	70	100
BPCM106	Fundamental Of Information Technology	30	70	100
BPCM107-P	Physical Chemistry -1-Lab	20	30	50
BPCM108-P	Mechanics, Oscillations–Lab	20	30	50
BPCM109P	Fundamental Of Information Technology -Lab	20	30	50
	Total	**240**	**510**	**750**

B.Sc. (PCM)				
Second Semester				
Code No.	**Subject**	**Internal Marks**	**External Marks**	**Total**
BPCM201	Hindi-I	30	70	100
BPCM202	Calculus	30	70	100
BPCM203	Organic Chemistry-1	30	70	100
BPCM204	Inorganic Chemistry-1	30	70	100
BPCM205	Electricity, Magnetism And Electromagnetic Theory	30	70	100
BPCM206	Thermodynamics	30	70	100
BPCM207-P	Organic Chemistry-1-Lab	20	30	50
BPCM208-P	Inorganic Chemistry-1-Lab	20	30	50
BPCM209-P	Electricity, Magnetism And Electromagnetic Theory- Lab	20	30	50
BPCM210-P	Thermodynamics-Lab			
	Total	**240**	**510**	**750**

B.Sc. (PCM)

Third Semester

Code No.	Subject	Internal Marks	External Marks	Total
BPCM301	English-II	30	70	100
BPCM302	Differential Equations	30	70	100
BPCM303	Statics	30	70	100
BPCM304	Physical Chemistry-2	30	70	100
BPCM305	Kinetic Theory And Statistical Physics	30	70	100
BPCM306	Soft Skill & Personality Enhancement	30	70	100
BPCM307-P	Physical Chemistry-2-Lab	20	30	50
BPCM308-P	Kinetic Theory And Statistical Physics - Lab	20	30	50
	Total	**220**	**480**	**700**

B.Sc. (PCM)

Fourth Semester

Code No.	Subject	Internal Marks	External Marks	Total
BPCM401	Hindi-II	30	70	100
BPCM402	Advanced Calculus	30	70	100
BPCM403	Organic Chemistry-2	30	70	100
BPCM404	Inorganic CHEMISTRY-2	30	70	100
BPCM405	Waves, Acoustics And Optics	30	70	100
BPCM406	PROPERTIES OF MATTER AND SOLID STATE PHYSICS	30	70	100
BPCM407-P	Organic Chemistry-2-Lab	20	30	50
BPCM408-P	Inorganic CHEMISTRY-2-Lab	20	30	50
BPCM409-P	PROPERTIES OF MATTER AND SOLID STATE PHYSICS-**Lab**	20	30	50
BPCM410-P	Waves, Acoustics And Optics -Lab	20	30	50
	Total	**260**	**540**	**800**

B.Sc. (PCM)

Fifth Semester

Code No.	Subject	Internal Marks	External Marks	Total
BPCM501	Statistics	30	70	100
BPCM502	Abstract Algebra	30	70	100
BPCM503	Physical Chemistry-3	30	70	100
BPCM504	Communication Skills	30	70	100
BPCM505	Electronics And Devices	30	70	100
BPCM506	Environmental Science	30	70	100
BPCM507-P	Physical Chemistry-3-Lab	20	30	50
BPCM508-P	Electronics And Devices-Lab	20	30	50
	Total	**240**	**510**	**750**

B.Sc. (PCM)

Fifth Semester

Code No.	Subject	Internal Marks	External Marks	Total
BPCM601	Hindi-III	30	70	100
BPCM602	Analysis	30	70	100
BPCM603	Organic Chemistry-3	30	70	100
BPCM604	Inorganic Chemistry-3	30	70	100
BPCM605	ATOMIC MOLECULAR AND NUCLEAR PHYSICS	30	70	100
BPCM606	RELATIVITY AND QUANTUM MECHANICS	30	70	100
BPCM607-P	Organic Chemistry-3- Lab	30	30	50
BPCM608-P	Inorganic Chemistry-3-Lab	20	30	50
BPCM609-P	ATOMIC MOLECULAR AND NUCLEAR PHYSICS-Lab	20	30	50
BPCM610-P	Relativity, Quantum Mechanics, -Lab			
	Total	**240**	**510**	**750**

English-I

(Subject Code-BPCM101)

Unit – I   **08**

    (I)   K.BharatIyer 'The Ideals of Indian Art'

    (II)   Rabindranath Tagore 'Where the mind is without fear'

Unit – II   **08**

    (I)   Vijay Tendulkar 'Silence: The court is in session'

Unit –III   **08**

    (I)   Meanings and importance of Etiquettes

Unit – IV   **08**

    (I)   Sentence Structure; Subject, Predicate, SVO, SVOO

    (II)   Verb

    (III) Noun

    (IV) Pronoun

    (V)   Articles

Unit – V   **08**

    (I)   Letter-Writing : Formal letters, Informal letters, elements of letter writing, format of formal letter writing. Writing skills

    (II)   Paragraph Writing

Reference Books : 1.English language & Indian Cultureby M P Granth Academy.

ALGEBRA AND TRIGONOMETRY

(Subject Code-BPCM102)

UNIT-1

Linear independence of row and column matrices, Row rank, column rank and rank of a matrix. Equivalence of column and row ranks. Eigenvalues, Eigenvector and the characteristic equation of a matrix Cayley-Hamilton theorem and its use in finding the inverse of a matrix.

UNIT-2

Applications of matrices to system of linear (both homogenous and non-homogeneous) equations. Theorems on consistency of a system of linear equations. Relations between the roots and coefficients of general polynomial equation in one variable. Transformation of equation. Descartes' rule of signs. Solution of cubic equations (Cardoon method)

UNIT-3

Definition of a group with example and simple properties. Subgroups. Cyclic groups. Cosset decomposition. Lagrange's theorem and its consequences. Fermat's and Euler's theorems. Homomorphism and isomorphism. Normal subgroup. Quotient groups.

UNIT-4

The fundamental theorem of homomorphism. Permutation groups. Even and odd permutations. The alternating group and Cayely's theorem. Introduction to Rings. Sub rings .Integral domains and fields. Characteristics of a ring.

UNIT-5

Demovire's theorem and its applications. Direct and inverse circular and hyperbolic functions. Logarithm of a complex quantity. Expansion of trigonometrically functions.

VECTOR ANALYSIS AND GEOMETRY

(Subject Code-BPCM103)

UNIT-1

Scalar and vector product of three vectors. Product of four vectors. Reciprocal vectors. Vector differentiation. Gradient divergence and curl.

UNIT-2

Vector integration. Theorems of Gauss. Green. Stokes and problems Based on these.

UNIT–3

General equation of second degree. Tracing of conics. System of conics cofocal Conic spaler equation of a conic.

UNIT-4

Equation of cone with given base. Generators of cone, condition for three Mutually for three mutually perpendicular generators. Right circular cone. Equation of cylinder and its properties.

UNIT-5

Central conicoids. Paraboloids. Plane sections of Concord. Generation lines. Cofocal concise.

BSCPCM		Total Marks: 100
Semester-I		Internal Marks: 30
Paper Code. – BPCM104		External Marks: 70
Physical Chemistry – I		No. of Hours: 60
		Total Credits: 02

Unit No.	Details	Nos. of Hours
1	**1.1 Mathematical Concepts** 1.1.1 Logarithmic relations, 1.1.2 Curves stretching, 1.1.3 Linear graphs and calculation of slopes, 1.1.4 Differentiation of functions like Kx, ex, xn, sinx, logx; maxima and minima, 1.1.5 Integration of some useful / relevant functions; 1.1.6 Factorials, 1.1.7 Probability, 1.1.8 General introductions to computers, components of a computers 1.1.9 Hardware and software, 1.1.10 Input-output devices, 1.1.11 Binary numbers and arithmetic; 1.1.12 Introduction to computer languages, Programming and operating systems	**07**
2	**2.1 Gaseous States** 2.1.1 Postulates of kinetic theory of gases, 2.1.2 Deviation from ideal behaviour, 2.1.3 Van der Waals equation of State, **2.2 Critical phenomenon**: 2.2.1 PV isotherms of ideal gases, 2.2.2 The isotherms of van der Waals equations, 2.2.3 Relationship between critical constants and vander Waals constants, 2.2.4 The law of corresponding states, 2.2.5 Root mean square, Average and most probable velocities. 2.2.6 Qualitative discussion of the Maxwell's distribution of molecular velocities, 2.2.7 Collision numbers, 2.2.8 Mean free path and collision diameter, 2.2.9 Liquefaction of gases (based on Joule Thompson effect).	**09**
3	**3.1 Liquid State** 3.1.1 Intermolecular forces, 3.1.2 Structure of liquids (a qualitative description) Structural differences between solids, 3.1.3 Liquids and gases.	**08**

	3.2	Liquid crystals:	
		3.2.1 Difference between liquid crystal,	
		3.2.2 Solid and liquid.	
		3.2.3 Classification,	
		3.2.4 Structure of nematic and cholestic phases and its Application.	
	3.3	**Colloidal State**	
		3.3.1 Definition and classification of colloids,	
		3.3.2 Solids in liquids (sols): properties- Kinetic,	
		3.3.3 Optical and electrical;	
		3.3.4 Stability of colloids,	
		3.3.5 Protective action,	
		3.3.6 Hardy-Schulz law,	
		3.3.7 Gold number.	
		3.3.8 Liquids in liquids (emulsions) types of emulsions,	
		3.3.9 Preparation. Emulsifier.	
		3.3.10 Liquids in solids(gels): its Classification, Preparation and properties	
		3.3.11 General applications of colloids.	
4	**4.1**	**Solid State**	**08**
		4.1.1 Definition of space lattice,	
		4.1.2 Unit cell Laws of crystallography –	
		(i) Law of constancy of interfacial angles	
		(ii) Law of rationality of indices	
		(iii) Laws of symmetry.	
		4.1.3 Symmetry elementsin crystals,	
		4.1.4 X-ray diffraction by crystals.	
		4.1.5 Derivation of Bragg.	
		4.1.6 Equation.	
		4.1.7 Determination of crystal structure *of* NaCI, KC1 and CsCI (Laue'c method and powder method.) Catalysis.characteristics of catalysed reactions,	
		4.1.8 Classification of catalysis miscellaneous. Examples	
5	**5.1**	**Chemical Kinetics-**	**08**
		5.1.1 Chemical kinetics and its scope,	
		5.1.2 Rate of a reaction,	
		5.1.3 Factors influencing the rate of a reaction concentration,	
		5.1.4 Temperature,	
		5.1.5 Pressure,	
		5.1.6 Solvent, Light,	
		5.1.7 Catalyst concentration dependence of rates,	
		5.1.8 Mathematical characteristics of simple chemical reactions-zero. order,	
		5.1.9 Pseudo order,	
		5.1.10 Half-life and mean life Determination of the order of reaction differential method,	
		5.1.11 Method of integration,	
		5.1.12 Method of half-life period and isolation method.	
	5.2	Theories of chemical kinetics:	
		5.2.1 Effect of temperature on rate of reaction Arrhenius equation;	

		5.2.2 Concept of activation energy.	
		5.2.3 Simple collision theory based on hard sphere model,	
		5.2.4 Transition state theory (equilibrium hypothesis.) Expression for the rate constant based on equilibrium constant and thermodynamic aspects.	

Reference Book:

1. Physical Chemistry, P.W. Atkins, ELBS.
2. Introduction to Quantum Chemistyry, A.K. Chandra, Tata Mc Graw Hill.
3. Quantum Chemistry, Ira N. Levine, Prentice Hall.
4. Coulson's Valence, R.McWeen y, ELBS.
5. Chemical Kinetics. K.J. Laidler, McGraw-Hill.
6. Kinetics and Mechanism of Chemical Transformation J.Rajaraman and J. Kuriacose, Mc Millan.

Text Books:

1. Unified chemistry MMN Tandon, Shiv lal Agarwal Publications.
2. Chemistry Yogbodh Prakshan.
3. Chemistry Navbodh Prakshan.
4. Advance Chemistry Physical Chemistry Gurdeep Raj

BSCPCM	Total Marks: 50
Semester-I	Internal Marks: 20
Paper Code. BPCM107P	External Marks: 30
Practical Physical Chemistry – I-P	No. of Hours: 30
	Total Credits: 01

Unit No.	Details	Nos. of Hours
1	1. Calibration of thermometer 2. Determination of melting point 3. Determination of boiling point 4. Determination of mixedmelting point 5. Preparation of solutions of various concentrations, NaOH, HCl, H_2SO_4. 6. To determine the velocity constant (specific reaction rate)of hydrolysis of methylacetate/ethyl acetate catalyzed by hydrogen ions at room temperature. 7. To study the effect of acid strength on the hydrolysis of an ester. 8. To compare the strength of HCl and H_2SO_4 by studying the kinetics of hydrolysis of ester. 9. To study kinetically the reaction rate of decomposition of iodide by H_2O_2. 10. Determination of surface tension / percentage composition of given organic mixtureUsing surface tension method. 11. Determination of viscosity / percentage composition of given organic mixture using viscosity method	

Reference Book:
1. Advanced Practical Inorganic chemistry , Gurdeep Raj.
2. College, practical chemistry , V K Ahluwalia ,Dhingra & Gulati.
3. Advance Practical chemistry , Jagdamba Singh.
4. Unified Practical Chemistry – I , Navbodh .

MECHANICS, OSCILLATIONS

(Subject Code -BPCM105)

UNIT – 1

Laws of motion, motion in a uniform field, components of velocity and acceleration in different coordinate systems (Cartesian, Cylindrical and Spherical) uniformly rotating frame, centripetal acceleration,

UNIT – 2

Coriolis force and its applications, Motion under a central force, Kepler's laws. Gravitational law and field. Potential due to a spherical body. System of particles, center of mass, equation of motion, conservation of linear & angular momentum, conservation of energy.

UNIT – 3

Rigid body notion, rotational motion, moments of inertia and their products, principle moments & axes, introductory idea of Euler's equations. potential well and periodic oscillations, case of harmonic small oscillations, differential equation and its solution, kinetic and potential energy, examples of simple harmonic oscillations, spring and mass system, simple and compound pendulum, torsional pendulum.

UNIT – 4

Bifilar oscillations, Helmholtz resonator, LC circuit, vibrations of a magnet, oscillations of two masses connected by a spring. Superposition of two simple harmonic motions of the same frequency, Lissajous figures, case of different frequencies. Damped harmonic oscillator', power dissipation, quality factor, examples, driven (forced) harmonic oscillator, transient and steady states, power absorption, resonance.

UNIT – 5

E as an accelerating field, electron gun, case of discharge tube, linear accelerator, E as deflecting field-CRO sensitivity, Transverse B field, 180 o deflection, mass spectrograph, curvatures of tracks for energy determination, principle of a cyclotron. Mutually perpendicular E and B fields-velocity selector, its resolution. Parallel E and B fields, positive ray parabolas, discovery of isotopes, elements of mass spectrography, principle of magnetic focussing (lens.)

PAPER 1 MECHANICS AND OSCILLATIONS (BPCM108-P)

PRACTICAL

1. To determine acceleration due to gravity "g" by compound pendulum (bar with holes).

2. To determine acceleration due to gravity "g" by Kater's reversible pendulum.

3. To study damping of a bar pendulum.

4. To study the theorem of parallel axis of moment of inertia.

5. To study the theorem of perpendicular axis of moment of inertia.

6. To determine the MI of a body using bifilar suspension method.

7. To determine the moment of inertia of a flywheel.

8. To determine the Young's modulus of material of a beam of cantilever method.

9. Study of oscillations of a mass under different combinations of springs.

10. To determine the MI of a body by a torsion pendulum.

11. To determine the modulus of rigidity of material of a wire by Maxwell's needle method.

Bachelor of Arts	Total Marks: 100
Semester-I	Internal Marks: 30
Paper Code. (BPCM106)	External Marks: 70
Fundamentals of I.T.	No. of Hours: 60
	Total Credits: 02

nit No.		Details	No s. of Hours
	1.1	**Fundamentals**	
	1.1.1	Major components of a computer (Block diagram, A brief introduction of CPU, Main Memory, I/O units, RAM, ROM, Keyboard, display, mouse, printers etc).	
	1.1.2	Hardware, Software, Secondary storage devices (hard disks, optical disks, flash memory), backup devices.	
	1.1.3	Bootstrapping.	
	1.1.4	Representation of Information,	
	1.1.5	Number Systems-binary, octal, decimal and hexadecimal, ASCII, EBDIC, BCD Gray code, Unicode. Conversion of bases.	
	2.1	**Algorithms**	
	2.1.1	Concept of algorithm and flow chart.	
	2.1.2	Writing simple algorithms and drawing flow charts for simple problems like finding sum, max, min, average of a list of numbers etc.	
	3.1	**Operating System**	
	3.1.1	Evolution of OS,	
	3.1.2	Types of OS,	
	3.1.3	Functions of OS.	
	3.1.4	DOS- Internal & external commands.	
	4.1	**Case study on any OS.**	
	4.1.1	[No questions on theory paper will be set on these topics] System features,	
	4.1.2	Software features,	
	4.1.3	File structure,	
	4.1.4	File handling,	
	4.1.5	Installation of OS,	
	4.1.6	Hardware & Software requirements.	
	5.1	**Computer Networks**	
	5.1.1	Data communication,	
	5.1.2	Transmission Media- Coaxial, UTP, Optical-Fiber, Wireless, Components of Computer Networks,	
	5.1.3	Types of wireless communication (mobile, WiFi, WiMAX, Bluetooth, Infrared –concept and definition only)	
	6.1	**Internet**	
	6.1.1	Evolution of internet,	
	6.1.2	Basic internet terms(Client, Server, MODEM, Web page, Web site, Home page, Browser, URL, ISP, Web server, Download & Upload, Online & Offline),	
	6.1.3	Internet applications (e-mail,search engines, ftp, VOIP, Video Conferencing, Audio-Video streaming, Chatting).	
	7.1	**Computer Security**	
	7.1.1	Definition,	
	7.1.2	Viruses and Worms,	
	7.1.3	Antivirus,	
	7.1.4	Digital Signature,	
	7.1.5	Software Piracy,	
	7.1.6	Firewall.	
	7.1.7	Hacking andCracking (basic concepts only for these topics will have to be given).	

| | **8.1** **Applications:** | |
| | 8.1.1 Office Automation, Railways, Airlines, Banking, Inventory Control, Education. | |

dfyaxk fo'ofo|ky;

vVy uxj] jk;iqj ¼N-x-½

Lukrd izFke o"kZ	dqy vad & 100
f}rh; lesLVj	vkarfjd ewY;kadu &30
fgUnh Hkk"kk&1	ckg~; ewY;kadu&70
Paper Code. BPCM-201	

bdkbZ &1 08

fgUnh /ofu;ksa dk Lo:i&

¼d½ Loj vkSj O;atu
¼[½ laKk] loZuke] fØ;k] fo'ks"k.k
¼x½ okD; lajpuk

bdkbZ &2 08

fgUnh 'kCn lajpuk&
i;kZ;okph] lekukFkZd] foyksekFkZd] vusdkFkZd] vusd 'kCnksa ds LFkku ij ,d 'kCn] leJqr 'kCn

bdkbZ &3 08

fyax fo/kku vkSj dkjd iz;ksx&

¼d½ orZuh
¼[½ fojkekfn fpUgksa ds iz;ksx
¼x½ eqgkojs vkSj yksdksfDr;ksa rFkk muds jpukRed iz;ksx

bdkbZ &4 08

milxZ] izR;;
i= ys[ku ¼vukSipkfjd ,oa vkSipkfjd i=½

bdkbZ &5 08

dfork & Hkkjr ekrk ¼lqfe=kuanu iar½
dgkuh & dQu ¼izsepan½
fuca/k & uekfe NRRkhlx<+ ¼izks- ghjkyky 'kqDy½

lgk;d xzaFk%&
1- jktHkk"kk fgUnh & xksfoUnnkl & fgUnh lkfgR; lEesyu] iz;kxA
2- jk"VªHkk"kk vkUnksyu & xksiky ij'kqjke &egkjk"Vª lHkkA
3- fojke fpUg& egsUnz jktk tSu& fdrkc?kj] fnYyhA
4- Hkkjrh;rk ds vej Loj & izks- /kut; oekZ e-iz- fgUnh xzaFk vdkneh ¼Hkksiky½
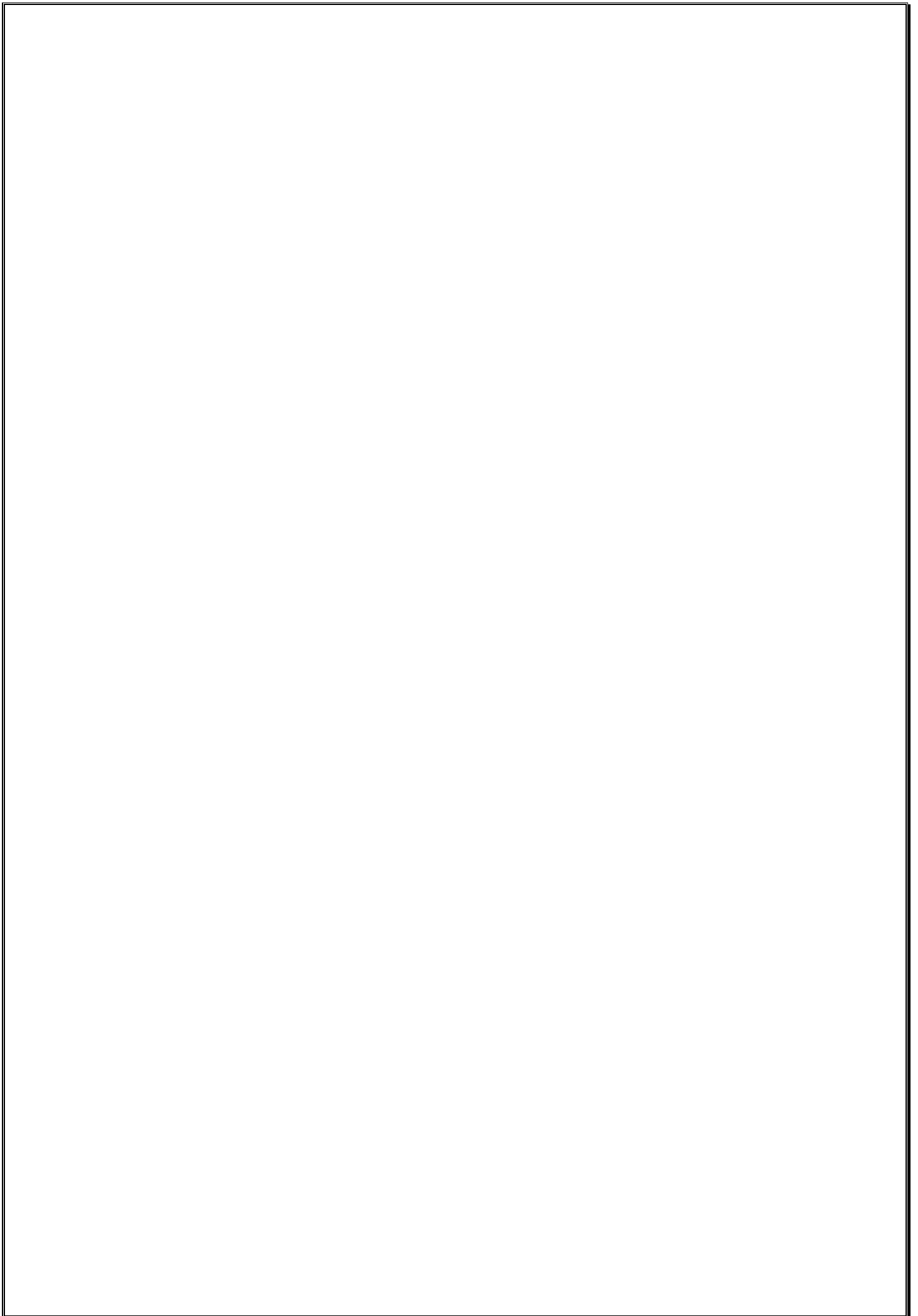
CALCULUS

(Subject Code-BPCM202)

Unit-1

Successive differentiation . Leibnitz theorem. Maclaurine and Taylor series expansions Asymptotes.

Unit-2

Curvature. Tests for concavity and convexity. Points of inflexion. Multiple points. Tracing of curves Cartesian and polar co -ordinates.

Unit-3

Definite integrals Quadrature. Rectification. Volumes and surfaces of solids of revolution.

Unit-4

Linear equation and equations reducible to the linear form. Exact differential equations. First order higher degree equations solvable forx, t,p, Clairaut's form and singular solutions Geometrical meaning of a differential equation . Orthogonal trajectories.

Unit-5

Linear differential equations with constant coefficients . Homogeneous linear ordinary differential equations. Linear differential equations of second order. Transformation of the equation by changing the dependent variable / the independent variable. Method of variation of parameters ordinary simultaneous diffenential equations.

ORGANIC CHEMISTRY-1

(Subject Code-BPCM203)

Unit No.	Details	Nos. of Hours

1	**1.1** **I Structure and Bonding**
	  1.1.1 Hybridizations,
	  1.1.2 Bond lengths and bond angles, Bond energy
	  1.1.3 Resonance
	  1.1.4 Hyperconjugation,
	  1.1.5 Inductive and field effects,
	  1.1.6 Hydrogen bonding,
	1.2 **Mechanism of Organic reactions**:
	  1.2.1 Homolytic and heterolytic bond breaking Electrophiles and nucleophiles.
	  1.2.2 Types of organic reactions.
	  1.2.3 Reactive intermediates- carbocations,
	  1.2.4 Carbanions,
	  1.2.5 Free radicals and carbenes.
	  1.2.6 Methods of determination of reaction mechanism.
		06

2	**2.1** **Stereochemistry**
	  2.1.1 Concept of isomerism,
	  2.1.2 Types of isomerism,
	  2.1.3 Optical isomerism,
	  2.1.4 Elements of symmetry,
	  2.1.5 Molecular chirallity,
	  2.1.6 Enantiomers,
	  2.1.7 Optical activity,
	  2.1.8 Distereoisomers,
	  2.1.9 Mesocompound
	  2.1.10 Walden Inversion
	  2.1.11 Relative and absolute configurations,
	  2.1.12 Sequence rules, D & L, R & S systems of nomenclature,
	  2.1.13 Nomenclature E and Z system
	  2.1.14 Conformational analysis of ethane and n-butane.
	  2.1.15 Conformations of cyclohexanes,
		08

3	**3.1** **Alkanes, Cycloalkanes and Aromaticity**
	  3.1.1 IUPAC nomenclature,
	  3.1.2 Classification,
	  3.1.3 Isomerism in alkanes,
	  3.1.4 Sources, and methods of preparation (with special reference to Wurtz, Kolbe.,
	  3.1.5 Corey.House,
	  3.1.6 Reactions and decaroxylation of carboxylic acids),
	  3.1.7 Physical properties and chemical reactions of alkanes.
	3.2 Cycloalkanes:
	  3.2.1 Nomenclature,
	  3.2.2 Methods of preparations, Chemical reaction
		08

		3.2.3 Bayer.s strain theory and its limitations	
		3.2.4 Structure of benzene molecular formula and Kekule structure.	
		3.2.5 Resonance structure.	
		3.2.6 MO picture.	
		3.2.7 Aromaticity and Huckel rule,	
		3.2.8 Aromatic electrophilic substitution general pattern of the mechanism, Mechanism of nitration,	
		3.2.9 Halogenation.	
		3.2.10 Sulphonation.	
		3.2.11 Mercuration and Friedel-Crafts reaction .	
4	**4.1**	**Alkenes , Dienes and alkynes** 4.1.1 Nomenclature of alkenes, 4.1.2 Methods of formation, 4.1.3 Mechanisms of dehydration of alcohols and dehydrohalogenation of alkyl halides, 4.1.4 Regio-selectivity in alcohol dehydration the Saytzeff rule, 4.1.5 Electrophilic and free radical additions, 4.1.6 Markownikoff.s rule, 4.1.7 hydroboration-oxidation oxymercuration reduction, 4.1.8 Epoxidation, 4.1.9 Ozonolysis, 4.1.10 Hydration, 4.1.11 Hydroxylation and oxidation with KMnO4, 4.1.12 Polymerization of alkenes, 4.1.13 Industrial applications of ethylene and propene 4.2 Dienes: 4.2.1 Structure of butadiene, 4.2.2 Methods of formation, 4.2.3 Chemical reactions-1,2 and 1,4 additions, 4.2.4 Diels Alder reaction. 4.2.5 Nomenclature, 4.2.6 Structure and bonding in alkynes. 4.2.7 Methods of formation. 4.2.8 Chemical reactions of alkynes, 4.2.9 Acidity of alkynes, 4.2.10 Mechanism of electrophilic and nucleophilic addition reactions,	**10**
5	**5.1**	**Alkyl and Aryl Halides** 5.1.1 Nomenclature and classes of alkyl halides, 5.1.2 Methods of formation, 5.1.3 Chemical reactions mechanims of nucleophilic substitution reaction of alkyl halides, 5.1.4 SN2 and SN1 reactions,with energy profile diagrams.	**08**
	5.2	**Polyhalogen compounds:** 5.2.1 Chloroform, 5.2.2 Carbon tetrachloride. 5.2.3 Methods of formation of aryl halides, 5.2.4 Synthesis and uses of DDT and BHC, Freon.	

Reference Books:

5. Unified chemistry MN Tandon, Shiv lal Agarwal Publications.
6. Chemistry YogbodhPrakshan.
7. Chemistry NavbodhPrakshan.
8. Chemistry R.P. Bhatnagar Arun publication.
9. Selected topics of organic chemistry,Morrison &Boyd.
10. Stereochemistry of organic compounds,P.S.Kalsi.

BSCBT	Total Marks: 50
Semester-II	Internal Marks: 20
Paper Code. BPCM207P	External Marks: 30
Organic Chemistry – I-P	No. of Hours: 30
	Total Credits: 01
Unit No.	**Details**	**Nos. of Hours**

Unit No.	Details	Nos. of Hours
1	1. Distillation 2. Crystallization 3. Decolourasation and crystallization using charcoal 4. Sublimation 5. Detection of elements (N, S and halogens) 6. Functional groups (phenolic, carboxylic, carbonyl, esters, carbohydrates,amines, amides, nitro and aniline) in simple organic compounds.	

BSCPCM	Total Marks: 100
Semester-II	Internal Marks: 30
Paper Code. BPCM204)	External Marks: 70
Inorganic Chemistry – I	No. of Hours: 60
	Total Credits: 02

Unit No.	Details	Nos. of Hours

1	**1.1 Atomic Structure**
	  1.1.1 Idea of de Broglie matter waves, Heisenberg uncertainty principle,
	  1.1.2 Atomic orbitals, Shapes of s, p, and d orbitals
	  1.1.3 Schrödinger wave equation,
	  1.1.4 Quantum numbers,
	  1.1.5 Aufbau and Pauli exclusion principles,
	  1.1.6 Hund.s multiplicity rules,
	  1.1.7 Electronic configurations of the elements,
	1.2 Periodic Properties –
	    1.2.1 Definition, Method of determination, Trends in periodic Table .
	    1.2.2 Atomic and ionic radii,
	  1.2.3 Ionization energy,
	  1.2.4 Electron Affinity
	    1.2.5 Electro negativity:
		10

2	**2.1 Chemical Bonding**
	  2.1.1 Covalent bond- valence bond theory and its limitations,
	  2.1.2 Directional characteristic of covalent bond,
	  2.1.3 Hybridization and shapes of simple molecules and ions.
	  2.1.4 Valence Shell Electron Pair Repulsion (VSEPR) theory with example
	  2.1.5 Molecular Orbital theory for homonuclear and heteronuclear (CO and NO) diatomic molecules,
	  2.1.6 Bond strength and the bond energy
	  2.1.7 Weak interactions - hydrogen bonding, Van der Waals forces
		9

3	**3.1 Ionic Solids**
	  3.1.1 Ionic structures,
	  3.1.2 Radius ratio effect and coordination number,
	  3.1.3 Limitation of radius ratio rule,
	  3.1.4 Lattice defects,
	  3.1.5 Semiconductors,
	  3.1.6 Lattice energy and Born-Haber cycle,
	  3.1.7 Solvation energy and solubility of ionic solids,
	  3.1.8 Polarizing power and polarizability of ions. Fajan.s rule,
	  3.1.9 Metallic bond free electron,
	  3.1.10 Valance bond and Band theories
		8

4	**4.1 p-Block Elements** 4.1.1 Comparative study (including diagonal relationship and	**7**

		properties) of groups 13-17 elements , Compounds like	
		4.1.2 hydrides,	
		4.1.3 Oxides,	
		4.1.4 Oxyacids	
		4.1.5 Halides	
		4.1.6 groups 13-16 Hydrides of boron-diborane and higher boranes.	
		4.1.7 Borazine,	
5	**5.1 p-Block elements** 5.1.1 Fullerenes, 5.1.2 Carbides, 5.1.3 Fluorocarbons, 5.1.4 Silicates (structural principle), 5.1.5 Interhalogens. 5.1.6 Properties of inert gases, 5.1.7 Chemistry of xenon, 5.1.8 Structure and bonding in xenon compounds.		**6**

Reference Book:

1. Advanced Inorganic Chemistry, F.A. Cotton and W ilkinson, John Wiley.

2. Selected topics in inorganic chemistry, Dr.Wahid U.malik , Dr.G.D.tuli , Dr. R.D. Madan.

3. Inorganic Chemistry, J.E. Huhey, Harpes& Row

Text Books:

11. Unified chemistry MMN Tandon, Shiv lal Agarwal Publications.

12. Chemistry Yogbodh Prakshan.

13. Chemistry Navbodh Prakshan.

BPCM	Total Marks: 50
Semester-II	Internal Marks: 20
Paper Code. BPCM 208P	External Marks: 30
Inorganic Chemistry – I-P	No. of Hours: 30
	Total Credits: 01

Un it No.	Details	Nos. of Hours
1	**Practical** Macro/semi-micro analysis- Cations, anions (zero to VI group) with interfering radicals. 1. Separation of cations by paper chromatography. 2. Preparation of ferrous alum.	**30**

Reference Book:

1. Advanced Practical Inorganic chemistry , Gurdeep Raj.

2. College, practical chemistry , V K Ahluwalia ,Dhingra & Gulati.

3. Advance Practical chemistry , Jagdamba Singh.

4. Unified Practical Chemistry – I , Navbodh .

ELECTRICITY, MAGNETISM AND ELECTROMAGNETIC THEORY

(Subject Code –BPCM205)

UNIT – 1

Columbs law in vacuum expressed in Vector forms calculations of E for simple distributions of charges at rest, dipole and quadrupole fields. Work done on a charge in a electrostatic field expressed as a line integral, conservative nature of the electrostatic field. Electric potential, torque on a dipole in a uniform electric field and its energy, flux of the electric field, Gauss's law and its application for finding E for symmetric charge distributions, Gussian pillbox?

UNIT – 2

Fields at the surface of a conductor screening of E field by a conductor, capacitors, electrostatic field energy, force per unit area of the surface of a conductor in an electric field, conducting sphere in a uniform electric field, point charge in front of a grounded infinite conductor. Dielectrics parallel plate capacitor with a dielectric, electric susceptibility, permittivity and dielectric constant, polarization and polarization vector, displacement vector, molecular interpretation of Claussius- Mossotti equation.

UNIT – 3

Steady current, current density, non-steady currents and continuity equation, Kirchhoff's law and analysis of multiloop circuits, rise and decay of current in LR and CR circuits, decay constants, transients in LCR circuits, AC circuits, complex numbers and their applications in solving AC circuit problems, complex impedance and reactance, series and parallel resonance, Q factor, power consumed by an a AC circuit, power factor.

UNIT – 4

Force on a moving charge, Lorentz force equation and definition of B, force on a straight conductor carrying current in a uniform magnetic field, torque on a current loop, magnetic dipole moment, angular momentum and gyromagnetic ratio. Biot-savart's law, Ampere's law field due to a magnetic dipole, magnetization current, magnetization vector, magnetic permeability (Linear cases), interpretation of a bar magnet as a surface distribution of sinusoidal current.

UNIT – 5

Electromagnetic induction, Faraday's law, electromotive force, integral and differential forms of Faraday's law Mutual and self inductance, Transformers, energy in a static magnetic field. Maxwell's displacement current, Maxwells' equations, electromagnetic field energy density. The wave equation satisfied by E and B, plane electromagnetic waves in vacuum, Poynting's vector & theorem.

ELECTRICITY, MAGNETISM AND ELECTROMAGNETIC THEORY

(BPCM209-P)

PRACTICAL

1. To determine the temperature coefficient of resistance of coil by PO Box.

2. To determine the specific resistance of the material of a given wire by Carey-Foster bridge.

3. To determine the resistance of a moving coil galvanometer by half deflection method.

4. To convert a given a moving coil galvanometer in to an ohmmeter (shunt type).

5. To determine the characteristic constant or ballistic constant of ballistic galvanometer.

6. Study of decay of currents in LR and RC circuits.

7. To determine (I) the horizontal component of earth magnetic field and (II) magnetic moment of the magnet.

8. To draw the BH curve for a specimen of iron in the form of ring.

9. To study of variation of magnetic field along the axis of a current carrying circular coil.

THERMODYNAMICS

(Subject Code-BPCM206)

UNIT – 1

The laws of thermodynamics : The Zeroth law, concept of path function and point function, various indicator diagrams, work done by and on the system, first law of thermodynamics, internal energy as a state function, reversible and irreversible change, Carnot theorem and the second law of thermodynamics. Different versions of the second law. Claussius theorem inequality.

UNIT – 2

Entropy, Change of entropy in simple cases (i) Isothermal expansion of an ideal gas (ii) Reversible isochoric process (iii) Free adiabatic expansion of an ideal gas. Entropy of the universe. Principle of increase of entropy. The thermodynamic scale of temperature, its identity with the perfect gas scale. Impossibility of attaining the absolute zero, third law of thermodynamics.

UNIT – 3

Thermodynamic relationships: Thermodynamic variables, extensive and intensive, Maxwell's general relationships, application to Joule-Thomson cooling and adiabatic cooling in a general system, Van der Waals gas, Clausius- Clapeyron heat equation.

UNIT – 4

Thermodynamic potentials and equilibrium of thermodynamical systems, relation with thermodynamical variables. Cooling due to adiabatic demagnetization, production and measurement of very low temperatures.

UNIT – 5

Blackbody radiation : Pure temperature dependence, Stefan-Boltzmann law, pressure of radiation, Special distribution of BB radiation, Wien's displacement law, Rayleigh-Jean's law, the ultraviolet catastrophe, Planck's quantum postulates, Planck's law, complete fit with experiment.

THERMODYNAMICS (BPCM 210P)
PRACTICAL

1. To determine the thermal conductivity of a metal rod using probes method.
2. To determine the thermal conductivity of a metallic rod (Cu) by Searle's apparatus.
3. To determine the thermal conductivity of a bad conductor by Lee's disk method.
4. To determine the thermal conductivity of a rubber in the form of a tube.
5. To determine coefficient of the thermal conductivity of glass in the form of a tube.
6. To determine the specific heat of liquid (turpentine oil) by the law cooling.
7. To determine the mechanical equivalent of a heat (J) by Callendar and Barne's constant methods.
8. To determine the mechanical equivalent of a heat with the help of Joule's calorimeter.

BSCPCM	Total Marks: 100
Semester – III	Internal Marks: 30
Paper Code. BPCMC 301	External Marks: 70
English-II	No. of Hours: 60
	Total Credits: 02

Unit No.	Details		Nos. of Hours
I	**(I)**	S.C. Dubey 'Basic Quality of Life'	
	(II)	Toru Dutt 'Sita'	
II	**(I)**	E.L. Turnbull 'Rana Pratap'	
III	**(I)**	Tense	
	(II)	Preposition	
	(III)	Adjective	
	(IV)	Adverb	
	(V)	Punctuation	
	(VI)	Conjunction	
IV	**(I)**	Voice : Active and Passive	
	(II)	Direct Narration	
	(III)	Indirect Narration	
V	**(I)**	Comprehension	
	(II)	Précis Writing	

Reference Books:

English Grammar and Composition – Wren & Martin

DIFFERENTIAL EQUATIONS

(Subject Code-BPCM302)

Unit-I

Series solutions of differential equations. Power series method. Bessel and Legendre. Functions and their properties-covergence, recurrence and generating relations. Orthogonality. Of functions. Sturm-Liouville problem. Orthogonality of eigen-functions. Reality of eigen values. Orthogonality of Bessel functions and Legend repolynomials

Unit-II

Laplace Transformation: Linearity of the Laplace transformation. Existence theorem for Laplace transforms. Laplace transformation of derivatives and integrals. Shifting theorems. Differentiation and integration of transforms. Convolution theorem. Solution of integral equations of differential using the Laplace transformation.

Unit-III

Partial differential equations of the first order. Lagrange's solution. Some special types of equations which can solve easily by methods other than the general method. Char pit's general method of solution.

Unit-IV

Partial differential equation of second and higher orders. Classification of linear partial differential equations of second order. Homogeneous equations with constant coefficients. Partial differential equations reducible to equations with constant coefficient . Monge's methods.

Unit-V

Calculus of Variations: Variation problems with fixed boundaries -Euler's equation for functional containing first order derivative and one independent variable. Externals. Functional dependent on higher order derivatives. Functional dependent on more than one independent variable. Variation problems in parametric in form. Invariance of Euler's equation under co-ordinates transformation.

Variation problems with Moving Boundaries : Functional son one and two functions. One sided variations. Sufficient conditions for an Extremum-Jacobi and Legendre conditions second variation. Variation principle of least action.

STATICS

(Subject Code-BPCM303)

Unit-I

Analytical conditions of equilibrium, Stable and unstable equilibrium, Virtual work, Catenary. Forces in three dimensions, Poinsot's central axis, Null lines and planes

Unit-II

Poinsot's central axis, Null lines and planes Stable and unstable equilibrium.

Unit-III

Dynamic: Simple harmonic motion, Elastic strings,Valocities and acceleration salongra dial and transverse directions, Projectile, Central orbits. Simple harmonic motion, Elastic strings. Kepler's laws of motion, Velocities and acceleration in tangential and directions.

Unit-IV

Motion on smooth and rough plane curves. Motion in a resisting medium. Motion of particles of varying mass.

Unit-V

Motion of particles of varying mass, Motion of a particle in three dimensions. Acceleration in terms of different co-ordinate systems. Central Orbits. Kepler's laws of motion. Motion of a particle in three dimensions.

PHYSICAL CHEMISTRY-2

(Subject Code-BPCM304)

UNIT -I

Thermodynamics I —

Definition of thermodynamic terms: system, surroundings etc. Types of systems, Intensiveand extensive properties. State and path functions and their differentials. Thermodynamicprocess. Concept of heat and work. First law of thermodynamics : statement, definition of internal energy and enthalpy. Heat capacity, heat capaciies at constant volume and pressure and their relationship. Joule's law, Joules - Thomson coefficient and inversion temperature. Calculation of W, q, dU and dH for the expansion of ideal gases under ideal isothermal and adiabatic conditions for reversible process. Thermochemistry : Standard state, standard enthalpy of formation, Hess' law of heat summation and its applications. Heat of reaction at constant pressure and constant volume. Enthalpy of neutralization. Bond dissociation energy and its calculation from thermochemical data, temperature dependence of enthalpy, Kirchhoff's eqn.

UNITII

Thermodynamics ll

Second law of thermodynamics: need for the law, different statements of the law. Camotcycle and its efficiency, Camot thecrem, Thermodynamic scale of temperature.Concept of entropy. entropy as a state function, entropy as a function of V & T, entropy asa function of P & T, entropy change in physical change, Clauslus inequality; entropy as acriteria of spontaneity and equilibrium. Entropy change in ideal gases and mixing of gases.Third law of thermodynamics: Nemsl heat theorem, statement and concept of residualentropy, evaluation af 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 thermodynarnic equilibrium and spontaneity, their advantage over entrapy change. Variation of Gand Awith P, Vand T.

UNIT III

Chemical Equilibrium

Equilibrium constant and free energy. Thermodynamic derivation of law of mass action. Le Chatelier's principle.Reaction isotherm and reaction isochore — Clapeyron equation and Clausius -Clapeyron equation, applications.

Phase Equilibrium

Statement and meaning of the terms — phase, component und degrees of freedom,derivation of Gibbs phase rule, phase equilibria of one component system — water, CO;and S systems.Phase equilibria of two component system — solid-liquid equilibria, Solid solutions - compound formation with congruent melting point (Mg-Zn} andincongruent melting point with examples .Liquid — liquid mixtures « keal liquid mixtures, Raoult's and Henry's law. Non-idealsystem-azeotropes — HCHO and ethanol = water systems.Partially miscible liquids with example Lower and upper consolute temperature. Nernst disinbution law — thermodynamic derivation, app

UNITIV

Electrochemistry I

Electical transport conduction in metals and in electrolyte solutions, specific conductancesnd equivalent conductance, measurement of equivalent condustance, vardation ofequivalent and specific conductance with dilution.Migration of lons and Kohlrausch law, Arrhenius theory of electrolyte dissociation and fislimitations, weak and strong electrolytes, Ostwald's dilution law its uses and limitations.Dabye-Huckel-Onsager's equation for strong electrolytes (elementary treatment only).Transport number, definition and determination by Hittorf method and moving boundarymethod.Applications of conductivity measurements: determination of degree of dissociation,determination of K, of acids, determination of solubility product of a sparingly soluble salt,conductometric titrations.

UNIT V

Electrochemistry Il

Types of reversible electrodos - gas-metal lon, metal-metal ion, metal-insoluble salt-anionand redox electrodes. Electrode reactions, Nemst equation, derivation of cell E.M.F. andsingle electrode potential, standard hydrogen: electrode-reference electrodes- standardelectrode potential, sign conventions, electrachemical series and its significance.Electrolytic and Galvanic cells — reversible and Irreversible cells, conventional representation of electrochemical cells.EMF of a cell and its measurements. Computation of cell EMF, Calculation ofthermodynamic quantities of cell reactions (AG, AH and K), polarization, over potential and hydrogen overveliage.

Concentration cell with and without transport, liquid junction potential, application of concentration cells, valency of lans. solubllity product and activity coefficient,potentiometric titrations.Definition of pH and pK, determination of pH using hydrogen, quinhydrone and glass electrodes, by potentiometric methods.Buffers — mechanism of buffer action, Hendarzon-Hazel equation. Hydrolysis of salts.Corrosion = types, theories and methods of combating it.

<div align="center">

PHYSICAL CHEMISTRY-2 (BPCM 307P)

PRACTICALS

</div>

Transition Temperature

1. Determination of the transition temperature of the given substance by thermometric/dialometric

method (e.g. MnCl.2HQrSrBra.2H,0).

Phase Equilibrium

1. Tostudy ihe effect of a solute (8.g. NaC, succinic acid) on the critical solution temperatura

of two padially miscibla liquids (0.9. phenolwater systar) and to daotarmino the

concentration of that solute in the given sheral-water systam.

2, To corstrct the phase diagram of two component (e.g. diphenylamine benzophenone)

system by ceoling curve method.

Thermochemistry

1, To determne the solubility of benzoic acid at different temperatures and Ic datermine 4H

of the dissolution process.

2. To determine the enthalpy of neutralisation of a weak acid/weak base versLs strong

base/strong avid and determine the enthalpy of ionisation of the weak avid'weak base.

3. To determine the enthalpy of solution of solid calcium chloride and calculate the lattice

energy of caicium chloride from ts enthalpy data using Born Haber cycle.

Reference Books:

1.   Unified chemistry MMN Tandon, Shiv lal Agarwal Publications.

2.   Chemistry Yogbodh Prakshan.

3.   3.Chemistry Navbodh Prakshan.

4.   Organic Chemistry, Bahl and Bahl, S.Chand Publication

5.   Advanced Physical Chemistry, Gurdeep Raj.

6.   Inorganic Chemistry by Gurdeep Raj.

KINETIC THEORY AND STATISTICAL PHYSICS

(Subject Code-BPCM305)

UNIT – 1

The laws of thermodynamics : The Zeroth law, concept of path function and point function, various indicator diagrams, work done by and on the system, first law of thermodynamics, internal energy as a state function, reversible and irreversible change, carnot theorem and the second law of thermodynamics. Different versions of the second law. Claussius theorem inequality. Entropy, Change of entropy in simple cases (i) Isothermal expansion of an ideal gas (ii) Reversible isochoric process (iii) Free adiabatic expansion of an ideal gas. Entropy of the universe. Principle of increase of entropy. The thermodynamic scale of temperature, its identity with the perfect gas scale. Impossibility of attaining the absolute zero, third law of thermodynamics.

UNIT – 2

Thermodynamic relationships : Thermodynamic variables, extensive and intensive, Maxwell's general relationships, application to Joule-Thomson cooling and adiabatic cooling in a general system, Van der Waals gas, Clausius-Clapeyron heat equation. Thermodynamic potentials and equilibrium of thermodynamical systems, relation with thermodynamical variables. Cooling due to adiabatic demagnetization, production and measurement of very low temperatures. Blackbody radiation : Pure temperature dependence, Stefan-Boltzmann law, pressure of radiation, Special distribution of BB radiation, Wien's displacement law, Rayleigh-Jean's law, the ultraviolet catastrophy, Planck's quantum postulates, Planck's law, complete fit with experiment.

UNIT – 3

Maxwellien distribution of speeds in an ideal gas: Distribution of speeds and of velocities, experimental verification, distinction between mean, rms and most probable speed values. Doppler broadening of spectral lines. Transport phenomena in gases : Molecular collisions, mean free path and collision cross sections. Estimates of molecular diameter and mean free path. Transport of mass, momentum and energy and interrelationship, dependence on temperature and pressure. Liquifaction of gases : Boyle temperature and inversion temperature. Principle of regenerative cooling and of cascade cooling, liquifaction of hydrogen and helium. Refrigeration cycles, meaning of efficiency.

UNIT – 4

The statistical basis of thermodynamics : Probability and thermodynamic probability, principle of equal a priori probabilities, statistical postulates. Concept of Gibb's ensemble, accessible and inaccessible states. Concept of phase space, canonical phase space, Gamma phase space and mu phase space. Equilibrium before two systems in thermal contact, probability and entropy, Boltzmann entropy relation. Boltzmann canonical distribution law and its applications, law of equipartition of energy. Transition to quantum statistics : 'h' as a natural constant and its implications, cases of particle in a one-dimensional box and one-dimensional harmonic oscillator.

UNIT – 5

In distinguish ability of particles and its consequences, Bose-Einstein & Fermi-Dirac conditions, Concept of partition function, Derivation of Maxwell-Boltzmann, Bose-Einstein and Fermi-Dirac Statistics through Canonical partion function. Limits of B.E. and F-D statistics to M-B statistics. Application of BE statistics to black body radiation, Application of F-D statistics to free electrons in a metal.

TEXT AND REFERENCE BOOKS:

1. B.B. Laud, "Introduction to Statistical Mechanics" (Macmillan 1981)
2. F. Reif : "Statistical Physics" (Mcgraw-Hill, 1998).
3. K, Haung : "Statatistical Physics" (Wiley Eastern, 1988).
4. Thermal and statistical Physics : R.K. Singh, Y.M. Gupta and S. Sivraman
5. Physics (Part-2) : Editor, Prof : B.P. Chandra, M.P. Hindi Granth Academy.
6. R P Goyal, Unified Physics Part – II, Shivlal & Co.

KINETIC THEORY AND STATISTICAL PHYSICS (BPCM 308P)
PRACTICAL

1. To determine the coefficient of linear expansion of a rod by optical level method.
2. To determine the critical temperature and critical pressure of a gas.
3. To determine the pressure coefficient of air by constant volume air thermometer.
4. To verify the law of probability distribution throwing one dice, two dice and ten dice.
5. To show the deviation of probability from theoretical value decreases with increases in number of events.
6. Study of statistical distribution from the given data and to find most probable average and rms value.
7. Study of random decay of nuclear disintegration and determine of decay constant using dices.
8. To verify the law of probability distribution throwing one coin, two coin and ten coin.

Subject Code-(BPCM 306)

SOFT SKILLS AND PERSONALITY ENHANCEMENT

Unit – I
- (I) Team Building – The magic of synergy, characteristics of an effective team, essentials of an effective team, Team Dynamics, Team Leading, Managing a Team.
- (II) Art of Negotiation –To understand what is negotiation, Ways of negotiating and being successful in it, To understand the power of language and non-verbal communication.
- (III) Grooming –To learn selection of proper attire as per the place, Practiced perception, How to carry one's self,
  How to project one's self in the positive frame and spirit.

Unit – II
- (I) Organising Meetings – How to announce, call and organize a meeting in a smooth manner, How to design Agenda and prepare Minutes of Meeting
- (II) Telephonic Etiquettes –Learn the tone and pitch of voice while speaking over phone, How to send a voice mail.
- (III) Business Etiquettes –What does business etiquettes mean, Professional and Cultural expectations, Effective writing, Corporate Communication, Interaction with foreign clients.

Unit –III
- (I) Stress Management –Types of stress, Symptoms and causes of Stress, Power of perception,
  Reaction to stress, Stress Management techniques.
- (II) Time Management – Importance of Time Management, Prioritising Tasks, Goal setting, Barriers to Time Management , Planning Routine and Time Tables.
- (III) Self Management –Self evaluation, Self discipline, Self criticism, SWOT analysis, Self Awareness, Development of the Self.

Unit – IV
- (I) Presentation Skills –How to prepare a presentation, Knowing the audience and their requirements, Effective ways to deliver presentation, How to prepare Multimedia presentation.
- (II) Organisational Skills – How to understand the nature and structure of organisation, To understand hierarchy and communication channel of the organisation, Clarity about the roles and responsibilities in an organisation, How to be a team member, How to draft reports
- (III) Leadership Skills

Unit – V
- (I) Group Discussion – Understanding the nature of discussion, Difference between debate and discussion, Ways to form and present arguments, Ways to defend your point.
- (II) Personal Interview –To learn the skills of appearing in an interview and being successful in it.
- (III) Public Speaking – Art of public speaking, To know the rhetoric of making a public speech, exploring rhetorical elements through various ideas..
- (IV) Conference and Meeting, Participation and Technical clarity in conference and meeting, Learning to listen and respond, Final Report drafting.

Reference Books:-
1. Soft Skill for everyone –Jeff Butterfield
2. Soft Skill for-S.I. Hariharan -MJP Publications
3. Personality Development & Soft skill – Goyal Brothers Prakasan

Lukrd izFke o"kZ	dqy vad & 100
prqFkZ lsesLVj	vkarfjd ewY;kadu &30
fgUnh Hkk"kk&2	ckg~; ewY;kadu&70

bdkbZ &1   08

    fgUnh dh miHkk"kkvksa dk lekU; ifjp;&
    1- if'peh fgUnh 2- iwohZ fgUnh
    3- jktLFkkuh 4- fcgkjh 5- igkM+h

bdkbZ &2   08

    jk"VªHkk"kk ds :Ik esa fgUnh dk fodkl&
    [kM+h cksyh dk lEidZ Hkk"kk ds :Ik esa fodkl

    jktHkk"kk% rkRi;Z ,oa egRo
    jk"VªHkk"kk fgUnh dh leL;k,¡

bdkbZ &3   08

    nsoukxjh fyfi&

    ¼1½ fodkl
    ¼2½ ukedj.k
    ¼3½ fo'ks"krk,¡

bdkbZ &4   08

    dk;kZy;hu i= &
    ifji=] vkns'k] vf/klwpuk] Kkiu] vuqLekjd

bdkbZ &5   08

    ikB ladyu&

    1- dfork & iq"Ik dh vfHkyk"kk ¼ek[kuyky prqosZnh ½
    2- dgkuh & mlus dgk Fkk ¼pUæ/kj 'kekZ xqysjh½
    3- fucU/k & yksHk vkSj izhrh ¼vkpk;Z jkepanz 'kqDy½

lgk;d xzaFk%&

1- fgUnh Hkk"kk dk mn~Hko vkSj fodkl& mn; ukjk;.k frokjh

2- ukxjh fyfi vkSj mldh leL;k,¡& ujs’k feJ

3- ukxjh fyfi vkSj fgUnh orZuh& fcgkj fgUnh xzaFk] vdkneh] iVuk

4- jk"VHkk"kk vkSj jk"Vªh; ,drk& fnudj] mn;kapy] iVuk

5- jktHkk"kk ds vkUnksyu esa & jktukjk;.k nqcs] izdk’ku laLFkku] fnYyh

6- jk"VªHkk"kk vkSj fgUnh & jktsUnz eksgu HkVukxj] ds-gh- laLFkku] vkxjk

ADVANCED CALCULUS

(Subject Code-BPCM402)

Unit-I

Definition of a sequence. Theorems on limits of sequences. Bounded and monotonic sequence. Cauchy's convergence criterion. Series of non-negative terms. Comparison tests. Cauchy's integral tests. Ratio tests, Raabe's, logarithmic, de Morgan and Bertrand's tests.(without proofs) Alternating series, Leibnitz's theorem . Absolute and conditional convergence.

Unit-II

Continuity of single variables Sequential continuity. Properties of continuous functions. Uniform continuity. Chain rule of differentiability. Mean value theorems and their geometrical interpretations.Darboux's intermediate values theorem for derivatives.

Unit-III

Limit and continuity of functions of two variables. Partial differentiation. Change of variables. Euler's theorem on homogeneous functions. Taylor's theorem for functions of two variables Jacobeans.

Unit-IV

Envelopes, Evolutes, Maxima, Minima and saddle point of functions of two variables. Lagrange multiplier method. Indeterminate forms.

Unit-V

Beta and Gamma functions. Double and triple integrals. Dirichlet's integrals, change of order of integration in double integrals.

ORGANIC CHEMISTRY-2

(Subject Code-BPCM403)

UNIT I

Electromagnetic Spectrum: Absorption Spectra   10 Hrs

Ultraviolet (UV) absorption spectroscopy — absorption laws (Beer-Lambert law), molar absorptivity, presentation and analysis of UV spectra, types of electronic transitions, effect of conjugation. Concept of chromophores and auxochrome. Bathochromic, hypsochromic,hyperchromic and hypochromic shifts. UV spectra of conjugated enes and enones.

Infrared (IR) absorption spectroscopy — molecular vibrations, Hooke's law, selection rules, intensity and position of IR bands, measurement of IR spectrum, fingerprint region, characteristic absorptions of various functional groups and interpretation of IR spectra of simple organic compounds.

UNIT II

Alcohols   6 Hrs

Classification and nomenclature. Monohydric alcohols --- nomenclature, methods of formation by reduction of aldehydes,ketones, carboxylic acids and esters. Hydrogen bonding, Acidic nature. Reactions of alcohols. Dihydric alcohols — nomenclature, methods of formation, chemical reactions of vicinal glycols and pinacol-pinacolone rearrangement.Trihydric alcohols — nomenclature and methods of formation, chemical reactions of glycerol.

Phenols   6 Hrs

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, Fries rearrangement, Claisen rearrangement,Gatterman synthesis, Hauben-Hoesch reaction, Lederer-Manashe reaction and Reimer-Tiemann reaction.

UNIT III

Aldehydes and Ketones   10 Hrs

Nomenclature and structure of 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 ammonia and its derivatives. Wittig reaction. Mannich reaction. Oxidation of aldehydes, Baeyer-Villiger oxidation of ketones, MPV, Clemmensen, Wolf-Kishner reaction, LIAIH4, and NaBH.

UNIT IV

Carboxylic Acids   4 Hrs

Nomenclature, structure and bonding, physical properties. acidity of carboxylic acids,effects of substituents on acid strength. Preparation of carboxylic acids. Reactions of carboxylic acids. Hell-

Volhard-Zelinsky reaction. Reduction of carboxylic acids. Mechanism of decarboxylation.Methods of formation and chemical reactions of halo acids. Hydroxy acids: malic, tartaric and citric acids.

Dicarboxylic acids: methods of formation and effect of heat and dehydrating agents.

Carboxylic Acid Derivatives   4 Hrs

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

UNIT V

Ethers and Epoxides   6 Hrs

Nomenclalure of ethers and methods of their formation, physical properties. Chemical reactions — cleavage and autoxidation, Ziesal's method. Synthesis of epoxides, acid and base catalysed ring opening of epoxides, orientation of epoxide ring opening, reactions of Grignard and organolithium reagents with epoxides.

Organic compounds of Nitrogen
Preparation of Nitroalkanes and Nitroarenes, chemical reactions of nitroalkanes, mechanism of nucleophilic substitution in nitroarenes and their reduction in acidic, basic and neutral medium. Picric acid.

ORGANIC CHEMISTRY-2P (BPCM407P)

PRACTICALS

Chromatography method of separation:

01. Separation and identification of amino acids by thin layer chemistry.
02. To study the separation of amino acids by column method chromatography.

Detection of organic functional group and preparation of suitable solid derivative

03. To identify the functional group in the given unknown organic compound and to prepare its derivative (Alcohol and Phenol)
04. To identify the functional group in the given unknown organic compound to prepare its derivative (aldehyde).
05. To identify the functional group in the given unknown organic compound to prepare its derivative (carboxylic acid)
06. To identify the functional group in the given unknown organic compound to prepare its derivative (aniline)
07. To identify the functional group in the given unknown organic compound to prepare its derivative (nitro benzene)
08. To identify the functional group in the given unknown organic compound to prepare its derivative (urea)

Preparation of some organic compounds:

09. Preparation of acetyl salicylic acid from salicylic acid.
10. Preparation of para bromoaniline from acetanalide.

INORGANIC CHEMISTRY-2

(Subject Code-BPCM404)

UNIT I

Chemistry of Elements of First Transition Series

Characteristic properties of d-block elements. Properties of the elements of the first transition series, their binary compounds andcomplexes illustrating relative stability of their oxidation states, coordination number and geometry.

UNIT lI

Chemistry of Elements of Second and Third Transition Series

General characteristics, comparative treatment with their 3d-analogues in respect of ionic radii, oxidation sates, magnetic behaviour, speciral properties and stereochemistry

UNIT III

Coordination Compounds

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.

Oxidation and Reduction

Use of redox potential data — analysis of redox cycle, redox stability in water — Frost,Latimer and Pourbaix diagrams. Principles Involved in the extraction of the elements,

UNIT IV

Electronic structure, oxidation states and ionic radii and lanthanide contraction, Complex formation, occurrence and isolation, lanthanide compounds.

Chemistry of Actinides

General features and chemistry of actinides, chemistry of separation of Np, Pu and Amtrom U, similarities between the later actinides and the later lanthanides

UNIT V

Acids and Bases

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

Non-aqueous Solvents

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

INORGANIC CHEMISTRY-2P (BPCM 408P)

PRACTICALS

Calibration of fractional weights, pipettes and bureties. Preparation of standard solutions.Dilution- 0.1 M lo 0.001 M solutions.

Quantitative Analysis

Volumetric Analysis

{a} Determination of acetic acid in commercial vinegar using NaOH

{b) Determination of alkali content - antacid tablet using HCL.

(c) Estimation of calcium contant 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 thiosulphate.

Gravimetric Analysis

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

WAVES, ACOUSTICS AND OPTICS

(Subject Code-BPCM405)

UNIT – 1

Waves in media: Speed of transverse vaves on a uniform string, speed of longitudinal waves in a fluid, energy density and energy transmission in waves, typical measurements. Production and detection of ultrasonic and infrasonic waves and applications. Reflection, refraction and diffraction of sound: Acoustic impedance of a medium, percentage reflection & refraction at a boundary, impedance matching for transducers, diffraction of sound, principle of a sonar system, sound ranging.

UNIT – 2

Fermat's Principle of extremum path, the aplanatic points of a sphere and other applications. Cardinal points of an optical system, thick lens and lens combinations. Lagrange equation of magnification, telescopic combinations, telephoto leneses. Monochromatic aberrations and their reductions, Optical instruments.

UNIT – 3

Interference of light: The principle of superposition's, two slit interference, coherence requirement for the sources, optical path retardations, lateral shift of fringes, Rayleigh refractometer Localised fringes; thin films. Haldinger fringes: fringes of equal inclination. Michelson interferometer and its application, Fabry-Perot interferometer and etalon.

UNIT – 4

Fresnel half-period zones, plates, straight edge, rectilinear propagation, Fraunhofer diffraction, Rayleigh criterion, resolving power of telescope and microscopic systems, Diffraction grating, Resolving power of a grating and comparison with resolving powers of prism and of a Fabry-Perot etalon. Double refraction and optical rotation: Refraction in uniaxial crystals, Phase retardation plates, double image prism. Rotation of plane of polarization, origin of optical rotation in liquids and in crystals.

UNIT – 5

Laser system: Purity of a spectral line, coherence length and coherence time, spatial coherence of a source, Einstein's A and B coefficients, Spontaneous and induced emissions, conditions for laser action, population inversion, Types of Laser: Ruby and, He-Ne and Semiconductor lasers. Applications of laser.

WAVES, ACOUSTICS AND OPTICS (BPCM410P)
PRACTICAL

1. To verify the laws of vibrating string using sonometer.

2. To determine frequency of a tuning fork using sonometer.

3. To determine frequency of an electrically maintained tuning fork using CRO.

4. To determine the velocity of ultrasonic wave in a given liquid.

5. To determine of cardinal points of a combination of lenses using nodal slide arrangement.

6. To determine the focal length of concave lens using a plane mirror using a convex lens.

7. To determine the radius of curvature of a plano-convex lens by Newton's ring apparatus.

8. To determine the refractive index of a prism for sodium light using spectrometer.

9. To determine the dispersive power of prism using mercury lamp.

10. To determination of a angular magnifying of power of telescope.

PROPERTIES OF MATTER AND SOLID STATE PHYSICS

(Subject Code-406)

UNIT – 1

Elasticity, small deformations, Hooke's law elastic constants for an isotropic solid and relations between them beams supported at both the ends, cantilever, torsion of cylinder, bending moments and shearing forces.

UNIT – 2

Kinematics of moving fluids, equations of continuity, Euler's equation, Bernoulli's theorem, viscous fluids, streamline and turbulent flow. Poiseuille's law. Capillary tube flow, Reynold's number, Stokes law, surface tension and surface energy, molecular interpretation of surface tension, pressure on a curved liquids surface, wetting.

UNIT – 3

Amorphous and crystalline solids, Elements of symmetry, seven crystal system, Cubic lattices, Crystal planes, Miller indices, Laue's equation for X-ray diffraction, Bragg's Law, Bonding in solids, classification. Cohesive energy of solid. Madelung constant, evaluation of Parameters.

UNIT – 4

Specific heat of solids, classical theory (Dulong-Petit's law). Einstein and Debye theories. Vibrational modes of one dimensional monoatomic lattice, Dispersion relation, Brillouin Zone. Free electron model of a metal, Solution of one dimensional Schrödinger equation in a constant potential. Density of states. Fermi Energy, Energy bands in a solid (KronigPenny model without mathematical details).

UNIT – 5

Metals, Insulator and Semiconductors, Hall Effect, Diamagnetism, Paramagnetism and Ferromagnetism. Langevin's theory of diamagnetic and paramagnetic. Curie Weiss's Law. Qualitative description of Ferromagnetism (Magnetic domains), B-H. Curve and Hysteresis loss.

PROPERTIES OF MATTER AND SOLID STATE PHYSICS (BPCM 409 P)
PRACTICAL

1. To determine surface tension of water by capillaries rise method.

2. To determine surface tension of water by Jaeger's method.

3. To determine the viscosity of water by Poiseuille's flow method.

4. To determine the viscosity of glycerin or castor oil by Stoke's method.

5. To determine the energy band gap of semiconductor by using pn junction diode.

6. To determine the energy band gap of semiconductor by four probes method.

7. To determine the Hall coefficient and mobility of charge carriers in a semiconductor material.

8. Identification of unknown elements from a line emission spectrum.

9. To determine the lattice parameter "a" of the unit cell of a cubic crystal using X ray diffraction films.

STATISTICS

(Subject Code-BPCM501)

UNIT -I
Frequency distribution- Measures of central tendency, mean, median, mode, G.M., H.M., partition values, measures of dispersion- range, inter quartile range, mean deviation, standard deviation, moments, skewness and kurtosis.

UNIT -II
Probability- Event, sample space, probability of an event, addition and multiplication theorems, Baye's theorem, continuous probability-probability density function and its applications for finding the mean, mode, median and standard deviation of various continuous probability distributions. Mathematical expectation, expectation of sum and product of random variables, moment generating function.

UNIT -III
Theoretical distribution- Binomial, Poisson, normal, rectangular and exponential distributions, their properties and uses.

UNIT -IV
Methods of least squares, curve, fitting, correlation and regression, partial and multiple correlations (upto three variable only).

UNIT -V
Sampling - Sampling of large samples, Null and alternative hypothesis, Errors of first and second,, kinds,−level of significance. critical region, tests of significance based of $x^2\ t\ F$

ABSTRACT ALGEBRA

(Subject Code-BPCM502)

UNIT -I

Group-Automorphism, inner automorphism. Automorphism groups. Contumacy relation and centralizer. Normalize, Counting principle and the class equation of a finite group. Cauchy's theorem and Sylow's theorems for finite abelian groups and non abelian groups.

UNIT -II

Ring theory-Ring homomorphism. Ideals and Quotient Rings. Field of Quotients of an Integral Domain. Euclidean Rings, Polynomial Rings, Polynomials over the Rational Field. Polynomial Rings over Commutative Rings. Unique factorization domain.

UNIT -III

Definition and examples of vector space. Sub space, Sum and direct sum of subspaces. Linear space. Linear dependence, independence and their basic properties. Basis Finite dimensional vector space. Existence theorem for bases, Invariance of the number of elements of a basis set. Dimension, Existence of complementary sub space of a sub space of a finite dimensional vector space. Dimension of sums of sub space, Quotient space and its dimension.

UNIT -IV

Linear transformations and their representation as matrices. The Algebra of linear transformations. The rank nullity theorem. Change of basis. Dual space, Bidual space and natural isomorphism. Ad joint of a linear transformation. Eigen values and eigenvectors of a linear transformation. Diagonalisation, Bilinear, Quadratic and Hermitical forms.

UNIT-V

Inner Product Spaces Cauchy-Schwarz inequality Orthogonal vectors. Orthogonal complements. Ortheornormal sets and bases. Bessel's inequality for finite dimensional spaces. Gram-Schmidt Orthogonalization process.

PHYSICAL CHEMISTRY-3

(Subject Code-BPCM503)

Unit -I

Spectroscopy -I

1. Electromagnetic radiation, regions of the spectrum, basic features of different spectrometers, statement of the Born Oppenheimer approximation, degree of freedom.

2. Rotational spectrum of diatomic molecules, Energy levels of a rigid rotator (Semi classical principles), Selection Rules, Spectral intensity, distribution using Population distribution (Maxwell -Boltzmann distribution) Determination of bond length, Qualitative description of non-rigid rotator, Isotope effect.

3. Raman Spectrum, Concept of Polarizability, Pure Vibrational and pure rotational Raman Spectra of diatomic molecules, Application of Raman Spectrum.

Unit -II

Spectroscopy -II

2. UV Spectroscopy: Electronic Excitation, elementary idea of instrument used, Application to structure determination of organic molecules. Woodward- fieser rule for determining λ max of α, β- unsaturated Carbonyl Compounds.

3. Infrared Spectrum: Energy levels of simple harmonic oscillator, selection rule, pure Vibrational spectrum, intensity, determination of force constant and qualitative relation of force constant and bond energies, effect of enharmonic motion and Isotope on the spectrum, Idea of Vibrational frequencies of different functional groups.

Unit -III

Photochemistry-I

Interaction of radiation with matter, difference between thermal and photochemical processes. Law of Photochemistry: Grothus-Draper law, Stark constant of Unimolecular reactions.

Photochemistry -II

Electronic transitions, Jablonski diagram depicting various process occurring in the excited state, Qualitative description of fluorescence, Phosphorescence, non-radiative Processes (Internal Conversion, Intersystem Crossing), Quantum Yield, Photosensitized reactions- energy transfer Processes.

Unit -IV

Physical Properties and Molecular structure optical activity, polarization- (Clausius- Mossotti equation), Orientation of dipole in electric field, dipole moment, induced dipole moment. Measurement of dipole moment- Temperature and refractivity method, dipole moment and structure of molecules.

Magnetic properties -Para magnetism, diamagnetism and ferromagnetism.

Unit-V

Solutions, Dilute and Colligative Properties- I

Ideal and non- ideal solutions, method of expressing concentrations of solutions, Activity and activity coefficient. Dilute solutions, colligative properties, Raoult's law, relative lowering of vapor pressure, molecular weight determination, osmosis, law of osmotic pressure and its measurement, determination of molecular weight from osmotic pressure solutions, Dilute solutions and Colligative properties -II Elevation of boiling point and depression of freezing point. Thermodynamics derivation of relation between molecular weight and elevation of boiling point and depression in freezing point.

Experimental methods for determining various colligative properties. Abnormal molar mass, degree of dissociation and association of solutes.

PHYSICAL CHEMISTRY-3 (BPCM 507P)

PRACTICAL

1. To estimate the amount of HCl present in the given solution conductometrically.
2. To determine the dissociation constant of weak electrolyte by conductivity method.
3. To estimate the concentration of ferrous ion using standard potassium dichromate from EMF measurements.
4. To verify Beer-Lamberts law for Potassium permanganate colorimetrically.
5. To estimate the amount of Copper present in the given cupraammonium sulphate by colorimetric method.
6. To estimate the amount of amino acid present in the given sample using spectrophotometry.
7. Estimation of Ferrous ion by using 1,10 Phenanthroline by colorimetric method.
8. To determine the saponification value of given sample of Oil

BSC (PCM)	Total Marks: 100
Communication Skill	Internal Marks: 30
Paper Code:-BPCM504	External Marks: 70
	No. of Hours: 40

Unit No.	Details	Nos. of Hours
1	**1.1 Introduction of Communication:** 1.1.1 Purpose of Communication 1.1.2 Process of Communication 1.1.3 Difference between technical & General Communication 1.1.4 Types of Communication 1.1.5 Basics to Communication	**8**
2	**2.1 Communication in Organisations:** 2.1.1 Internal Communication – Stake Holders & channels in Internal Communication 2.1.2 External Communication- stake Holders & channels in External Communication 2.1.3 Communication Network- Scope & types, formal and Informal Communication Network 2.1.4 Language for Communication- General Principle, expressions & words to be avoided Grammar & usage	**8**
3	**3.1 Writing Business Letter-** 3.1.1 Importance, Structure, Format and types of Business Letters **3.2 Writing Memos, Circulars and Notice-** 3.2.1 Importance, Structure, Format and Language of memo, circulars & Notice	**8**
4	**4.1 Report Writing-** 4.1.1 Features & Purpose of report Writing 4.1.2 Difference between business report & engineering report 4.1.3 Types of reports 4.1.4 Structure Format and language of report Writing	**8**
5	**5.1 Meetings:-** 5.1.1. Planning a Meeting 5.1.2. Agenda of Meeting 5.1.3. Minutes of Meeting 5.1.4. Structure and format of Agenda and minutes of meeting	**8**

Reference Book:-

1. Adais, John. Effective Communication London, Pan Macmillan LTd. 2003
2. Guffoy, Mary rller Essentials of Business Writing Ohio: Saouth – western College pub. 2000
3. Hassan, Gill Brilliant Communication Skill Great Britain , Pearson Education ,2012

ELECTRONICS AND DEVICES

(Subject Code-BPCM505)

UNIT – 1

Intrinsic semiconductors, carrier concentration in thermal equilibrium, Fermi level, Impurity semiconductor, doner and acceptor levels, Diode equation, junctions, junction breakdown, Depletion width and junction capacitance, abrupt junction,

UNIT – 2

Tunnel diode, Zener diode. Light emitting diode, solar cell, Bipolar transistors, pnp and npn transistors, characteristics of transistors, different configurations, current amplification factor.

UNIT – 3

Half and full wave rectifier, rectifier efficiency ripple factor, Bridge rectifier, Filters, Inductor filter, T and N filters, Zener diode, regulated power supply.

UNIT – 4

Applications of transistors: Bipolar Transistor as amplifier, Single stage and CE small signal amplifiers, Emitter followers, Transistors power amplifier, Transistor as oscillator, Wein-Bridge Oscillator and Hartley oscillator.

UNIT – 5

JFET: basic construction transistor action, concept of pinch off, maximum drain saturation current, input and transfer characteristics. Operation amplifier: concept of ideal operational amplifier, ideal opamp parameter, inverting and non-inverting and unity gain amplifiers, adders, difference amplifiers and integrators.

ELECTRONICS AND DEVICES (BPCM 508P)
PRACTICAL

1. To study the V-I characteristics of a forward and reversed biased P-N junction diode.

2. To study the characteristics of a Zener diode.

3. To study the characteristics of a Photo diode.

4. To study the characteristics of a Solar cell and hence verify the inverse square law.

5. To study the characteristics of a NPN/PNP transistor in CE configuration.

6. To study the characteristics of a NPN/PNP transistor in CB configuration.

7. To study the characteristics of a NPN/PNP transistor in CB configuration.

8. To study the characteristics of a FET.

9. To study the characteristics of a JFET.

ENVIROMENTAL SCIENCE

Paper Code (BPCM506)

UNIT – I

General: Environmental segments, environmental degradation, environmental impact assessment.

Concept of Ecosystem: Fundamental of Ecology and Ecosystem, components of ecosystem, food-chain, food-web, trophic levels, energy flow, cycling of nutrients, major ecosystem types (forest, grass land and aquatic ecosystem).

UNIT – II

Air Pollution: Atmospheric composition, energy balance, classification of air pollutants, source and effect of pollutants – Primary (CO, SOx, NOx, particulates, hydrocarbons), Secondary [photochemical smog, acid rain, ozone, PAN (Peroxy Acetyl Nitrate)], green house effect, ozone depletion, atmospheric stability and temperature inversion, Techniques used to control gaseous and particulate pollution, ambient air quality standards.

UNIT – III

Water Pollution: Hydrosphere, natural water, classification of water pollutants, trace element contamination of water, sources and effect of water pollution, types of pollutants, determination and significance of D.O., B.O.D., C.O.D. in waste water, Eutrophication, methods and equipment used in waste water treatment preliminary, secondary and tertiary.

UNIT – IV

Land Pollution & Noise Pollution: Lithosphere, pollutants (agricultural, industrial, urban waste, hazardous waste), their origin and effect, collection of solid waste, solid waste management, recycling and reuse of solid waste and their disposal techniques (open dumping, sanitary land filling, thermal, composting).

Noise Pollution: Sources, effect, standards and control.

UNIT – V

Environmental Biotechnology: Definition, current status of biotechnology in environmental protection, bio-fuels, bio-fertilize, bio-surfactants, bio-sensor, bio-chips, bio-reactors.

Pollution Prevention through Biotechnology: Tannery industry, paper and pulp industry, pesticide industry, food and allied industry.

Text Books

1.   Environment and Ecology by Piyush Kant Pandey and Dipti Gupta (Sum India Publication)

2.   A Textbook of Environmental Chemistry and Pollution Control by S.S. Dara (S. Chand and Company)

Reference Books:
1.   Masters, G.M. Introduction to Environment Engineering and Science (Prentice Hall of India).
2.   Environmental Chemistry by A.K. Dey (Eastern Ltd.).
3.   Environmental Chemistry by B.K. Sharma (Krishna Prakashan).
4.   Nebel B.J. Environmental Science (Prentice Hall of India-1987).
5.   Environmental Biotechnology by S.N. Jogdand (Himalaya Publishing House).
6.   Introduction to Environmental Biotechnology by A.K. Chatterji (Prentice Hall of India).

(BPCM 601) – HINDI

Lukrd	dqy vad & 100
'k"Be~~ lsesLVj	vkarfjd ewY;kadu &30
fgUnh Hkk"kk&3	ckg~; ewY;kadu&70

bdkbZ &1   08

    ekud fgUnh Hkk"kk & ekud] vekud] miekud Hkk"kk
     ehfM;k ds izeq[k vax ,oa mudh Hkk"kk
    1- lekpkj i= 2- nwjn'kZUk 3- vkdk"kok.kh 4- foKkiu

bdkbZ &2   08

      ¼d½ dFku dh 'kSyh & fooj.kkRed] ewY;kaduijd] O;k[;kijd] fopkjkRed
     ¼[k½ fofHkUu lajpuk,¡ & fouezrklwpd] fof/klwpd] fu"ks/kijd] dkycks/kd]

bdkbZ &3   08

    vuqokn & Lo:Ik] egRo] vuqokn izfØ;k] vuqokod dh
    fo'kss"krk,¡ fgUnh esa inuke] fgUnh vifBr

bdkbZ &4   08

    laf/k] lekl ,oa laf{kfIr;k¡

bdkbZ &5   08

    ikB ladyu &

    1-   dfork & Hkwyxyrh ¼xtkuu ek/ko eqfDrcks/k ½
    2-   dgkuh & bZnxkg ¼izsepan½
    3-   fucU/k & Mk¡- [kwcpan c?ksy ¼gfj Bkdqj½

ANALYSIS

(Subject Code-BPCM602)

UNIT -I

Riemann integral, Inerrability of Continuous and monotonic functions fundamental theorem of integral calculus. Mean value theorems of integral calculus.

Partial derivation and differentiability of real-valued functions of two variables. Sehwarz Young's theorem. Implicit function theorem.

UNIT -II

Improper integrals and their convergence, Comparison tests. Abel's and Dirichlet's tests. Frullani's integral. Integral as a function of a parameter. Continuity, derivability and inerrability of an integral function of a parameter.

Fourier series of half and full intervals.

UNIT -III

Complex numbers as ordered pairs. Geometric representation of complex numbers, Stereographic projection.

Continuity and differentiability of Complex functions. Analytic functions. Cauchy-Riemann equations. Harmonic functions.

Mobius transformations. Fixed points. Cross ratio. Inverse points and critic mappings. Conformal mappings.

UNIT -IV

Definition and examples and metric spaces. Neighborhoods. Limit points. Interior points. Open and closed sets. Closure and interior. Boundary points. Sub space of a metric space. Cauchy sequences. Completeness. Cantor's intersection theorem. Contraction principle. Real numbers as a complete ordered field. Dense subsets. Baire Category theorem. Separable, second countable and first countable spaces.

UNIT -V

Continuous functions. Extension theorem. Uniform continuity. Compactness, Sequential compactness. Totally bounded spaces. Finite intersection property. Continuous functions and compact sets. Connectedness.

ORGANIC CHEMISTRY-3

(Subject Code-BPCM603)

Unit -I

Carbohydrates

Classification and Nomenclature, Monosaccharide, mechanism if osazon formation, interconversion of Glucose and Fructose, chain lengthening and chain shortening of Aldoses. Conversion of glucose into mannose. Configuration of monosaccharide, erytho and threo diasterioisomers. Conversion of glucose into mannose. Formation of glucosides, ethers and esters, determination of ring size of monosaccharide, cyclic structure of D(+) glucose, mechanism of Mutarotation. Structure of Ribose and deoxyribose. Stereochemistry of monosachharides. An introduction to glycosidic linkage in di- and poly- saccharids. Reducing and non reducing sugars. Structure determination of maltose, sucrose, starch and cellulose.

Unit -II

Elementary Idea of fats, oils, Detergents and Dyes-

Natural fats, edible and industrial oils of vegetable origin, common fatty acids, glycerides, hydrogenation of unsaturated oils. Soapnificationvalue, iodine value, acid value. Soap and Detergents. Classification of Dyes, Chemistry and Synthesis of Methyl orange, Congo red,Malachite green, Crystal violet, Phenolphthalein, fluorescein, Alizarinand Indigo.

Unit -III

Organic synthesis via Enolates- Organic synthesis via Enolates. Acidity of α-hydrogen, 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.

Heterocyclic compounds- Nomeclature of heterocyclic compound, Furan, pyrrole, pyridine, thiol method of preparation, properties and application.

Unit –IV

Amines : Structure and nomenclature of amines. physical proparties.Sterecchemisiry of amines. Separation of a mixture of primary, secondary and tertiary amines. Structural features effecting basicily of amines. Amine salts as phase-transfer catalysis. Preparation of alkyl and aryl amines (reduction of nitro compounds. nitrites),reductive amination of aldehydic and ketonic compounds. Gabriel phthalimide reaction,Hoffmann bromamide reaction.Reactions of amines, electrophilic aromatic substitution In aryl amines, reactions of amines with nitrous acid. Synthetic transformations of aryl diazonium salts, azo coupling.

Unit –V

Amino acids- Classification, structure and stereochemistry of amino acids, acid-base behavior, iso-electric point, general method of preparations and properties of α-amino acids. Protein and Peptides-Introduction to peptides linkage, synthesis and end group analysis of Peptides. Solid Phase synthesis, classification, properties and structure of proteins (Primary, secondary and tertiary). Nucleic Acids-

Nucleic Acid- Introduction, Constituents of Nucleic acids. Ribonucleosides and ribonodeotides. The double helical structure of DNA.

Reference Books:

Unified chemistry MMN Tandon , Shiv lal Agarwal Publications.
Chemistry Yogbodh Prakshan.
Chemistry Navbodh Prakshan.
Organic chemistry Vol. I & II by I.L.Finar

ORGANIC CHEMISTRY-3 (BPCM 607P)

PRACTICAL

Laboratory Techniques

A Steam Distillation

Napthalene from its suspension in water, clove oil from cloves

Separation of ortho and para-nitrophenols.

B ColumnChromatography

Separation of fluorescein and methylene blue

Separation of leaf pigments from spinach leaves

Resolution of recemic mixlure of (+,-) mandelic acid.

Oualitative Analysis

Analysis of an organic mixture containing two solid components using water, $NaHCO_3$,

NaOH tor separation and preparation of suitable derivatives.

Synthesis of Organic Compounds

 a) Acetylation of salicylic acid, aniline, glucose and hydroquinone. Benzoylation of anlline and phenol.

 b)   Aliphatic electrophilic substitution- Preparation of iodoform from ethanol and acetone
 c) Aromatic electrophilic substitution.
 d) Nitration-Preparation of m-dinitrobenzene, p-nitroacelanilide.
 e) Halogenation- Preparation ol p-bromoacetanilide, 2,4,6 tribromophenol.
 f)   Diazotization/coupling- Preparation of metyl orange and methyl red.
 g) Oxidation- Preparation of benzoic acid from toluene.
 h) Reduction- Preparation of aniline from nitobenzene, m-nitroaniline from m_dinitrobenzene.

INORGANIC CHEMISTRY-3

(Subject Code-BPCM604)

Unit -I

Bioinorganic Chemistry -I

Essential and trace element in biological processes, Metalloporphyrims with special reference to hemoglobin and myoglobin, Biological role of alkali and alkaline earth metal ions with special reference of Ca^{2+}, Nitrogen Fixation, Bioinorganic Chemistry -II, Role of metal ions in biological process, Na/K Pump, Metal Complex as therapeutic agents- anticancer agents, antiarthirits drug and Relation therapy.

Unit -II

Hard and Soft Acids and Bases (HSAB) Classification of acids and bases as hard and soft, Pearson's HSAB Concept, Acid-base Strength and hardness and softness, symbiosis, theoretical basis of hardness and softness, elecronegativity and hardness and softness.

Gravimetric Analysis- Principles of gravimetric estimation, super saturation, co-precipitation, post-precipitation and Ash treatment with respect to the estimation of Ba, zn and cu, water analysis. Hardness, types of hardness- Temporary, Permanent and total hardness, acidity and alkalinity, BOD, COD and DO.

Unit -III

Inorganic Polymers

Introduction and Scope of inorganic polymers: Special characteristics, classification, homo and hetero atomic polymers and their applications.

Silicon's and Phosphazenes- Silicones and Phosphazenes as example of inorganic Polymers, nature of bonding in triphosphazenes.

Unit -IV

Organometallic Chemistry I

Definition, nomenclature and classification of organometallic compound, Preparation, properties, bonding and applications of alkyls and aryls of Li, Al.

A brief account of metal-ethylenic complexes and homogenous hydrogenation, mononuclear carbonyls and the nature of bonding in metal Carbonyls. Transition metal organometallic compounds with bonds to hydrogen and boron.

Unit –V

Organometallic Chemistry II

The Grignard's reagents- formation, structure, and synthetic applications. Organozinc compound: Formation and chemical reactions. Organ lithium compound: Formation and Chemical reactions. Nomenclature, structure features, method of formation and chemical reactions of thiols, thioethers, sulhonic acids, sulphonamides and sulphaguanidine.

Reference Books:

Unified inorganic chemistry
Chemistry Yogbodh Prakshan.
Chemistry Navbodh Prakshan.
Inorganic chemistry Z. Lee.

(BPCM 608P)

INORGANIC CHEMISTRY-3 PRACTICAL

1. Synthesis Analysis
a) Preparation of Sodium trioxalato ferrate (lll), $Na_3[Fe(COO)_3]$ and determination of its composition by Permanganometry.
b) Preparation ol N|-DMG complex, $[Ni(DMG)_2]$
c) Preparation ot copper tetraammine complex, $[Cu(NH_3)_4]SO_4$.
d) Preparation of cis-and trans-bioxalalo diaqua chromate (lll) ion.
2. Gravimetric Analysis- Analysis of Cu as CuSCN or CuO, Ni as $Ni\{DMG)_2$, Ba as $BaSO_4$ and Fe as Fe_2O_3

ATOMIC MOLECULAR AND NUCLEAR PHYSICS

(Subject Code-BPCM605)

UNIT – 1

Atomic Physics: Brief review of Bohr and Sommerfeld model of atom. Effect of finite nuclear mass in relation to Rydberg constant. Idea of discrete energy levels and electron spin: Fanck – Hertz and Stern – Gerlach experiments Significance of four quantum numbers and concept of atomic orbital's.

UNIT – 2

One valence electron atom: Orbital magnetic dipole moment, Orbital, spin and total angular momenta, Larmor precession, Vector model of atom, Electronic configuration and atomic states, Spin-orbit interaction and fine structure, Intensity of spectral lines, General selection rules. Normal Zeeman Effect. Two valence electron atoms: LS and JJ coupling schemes and resulting spectra. Idea of normal and inverted doublet. Basics of stark effect.

UNIT – 3

Spectra of hydrogen, deuteron and alkali atoms spectral terms, doublet fine structure, screening constants for alkali spectra for s,p, d and f states, selection rules. Discrete set of elctronic energies of moleculers, quantisation of vibrational and rotational energies, determination of internuclear distance, pure rotatinal and rotation vibration spectra. Dissociation limit for the ground and other electronic states, transition rules for pure vibration and electronic vibration spectra. Raman Effect, Stokes and anti-Stokes lines, complimentary character of Raman and infrared spectra, experimental arrangements for Raman spectroscopy.

UNIT – 4

Properties of Nuclei and Models: Introduction to the nucleus, Fermi gas model, Binding energy, Bethe-Weizsaecker mass formula and its application to explain most stable isobars and nuclear fission, Inferences of nuclear size from elastic electron nucleus experiments (no derivation). Nuclear Force and Two-nucleon System: Properties of nucleon-nucleon interaction, General forms of N-N potential, Description of low energy neutron proton scattering to show the spin dependence of nuclear force, Ground state properties of deuteron, Simple consideration of deuteron using central potential (square well).

UNIT – 5

Nuclear Stability: Nucleon emission, separation energy, Alpha decay and its energy spectrum, Q-value, Gamow's theory of alpha decay (no derivation), Beta decay and its energy spectrum (for example, ^{137}Cs), Need for neutrinos, Q-value for beta decay, Gamma decay, Selection rules for gamma transitions (no derivation).

ATOMIC MOLECULAR AND NUCLEAR PHYSICS (BPCM 609P)
PRACTICAL

1. To determine the Rydberg constant for Hydrogen.
2. To study absorption spectra of Iodine vapor and to determine the dissociation energy and force constant.
3. To estimate the temperature of sodium flame by studying the reversal of the spectral line (D-line).
4. To draw the plateau curve of a given GM counter.
5. X-Ray Diffraction – Determination of lattice parameters of a crystalline solid
6. UV-Vis Spectrophotometer – Determination of absorption coefficient and band gap.
7. FTIR Spectrometer – Determination of vibration levels in a compound.
8. Superconductivity – Determination of transition temperature.

   Thin Film Deposition and Measurement of Electrical Conductivity four probe method.

RELATIVITY AND QUANTUM MECHANICS

(Subject Code-BPCM606)

UNIT – 1

Reference systems, inertial frames, Galilean invariance and conservation laws, propogation of light, Michelson-Morley experiment, search for ether. Postulates for the special theory of ralativity, Lorentz tranformations, length contraction,time dilation, velocity additon theorem, variation of mass with velocity, mass-energy equivalence, particle with zero rest mass, Compton effect.

UNIT – 2

Origin of the quantum theory: Failure of classical physics to explain the phenomena such as black-body spectrum, photoelectric effect. Wave-particle duality and uncertainty principle: de Broglie's hypothesis for matter waves: the concept of wave and group velocities, evidence for diffraction & interference of particles,

UNIT – 3

Experimental demonstration of mater waves. Davisson and Germer's experiment. Consequence of de Broglie's concepts, quantisation in hydrogen atom, energies of a particle in a box, wave packets. Consequence of the uncertainty relation : gamma ray microscope, diffraction at a slit.

UNIT – 4

Quantum Mechanics: Schrodinger's equation. Postulatory basis of quantum mechanics, operators, expectation values, transition probabilities, applications to particle in a one and three dimensional boxes, harmonic oscillator in one dimension, reflection at a step potential, transmission across a potential barrier.

UNIT – 5

Hydrogen atom: natural occurrence of n, l and m quantum numbers, the related physical quantities. Angular momentum.

RELATIVITY AND QUANTUM MECHANICS (BPCM610P)
PRACTICAL

1. To determine the electric charge of an electron by Millikan's oil drop method.

2. To determine the value of e/m of an electron by Busch's helical beam method.

3. To determine the value of specific charge (e/m) of an electron by Thomson's method.

4. To determine the electronic charge (e) and work function of cathode material using photo cell.

5. To determine the plank constant "h" by photo cell.

6. To study of divergence of Laser beam.

7. To study double slit interference by He-Ne laser.

8. To determine the wavelength of Laser beam using plane transmission grating.

9. To study Laser as a monochromatic source (to find wedge angle of a glass plate).