

GURU KASHI UNIVERSITY



INTEGRATED TEACHER EDUCATION PROGRAMME
(ITEP)B.Sc.B.Ed (Secondary Stage)

Session: 2026-27

Faculty of Education

Graduate Attributes of the Programme: -

Type of learning outcomes	The Learning Outcomes Descriptors
Graduates should be able to demonstrate the acquisition of:	
Learning outcomes that are specific to disciplinary/inter disciplinary areas of learning	Graduates will demonstrate a strong interdisciplinary foundation in the disciplines of Arts and Education, supported by proficiency in at least one artistic discipline and sound pedagogical competence. They will be capable of integrating artistic knowledge, creative practices, and innovative pedagogical approaches into teaching-learning processes to foster creativity, critical thinking, aesthetic appreciation, and experiential learning. Graduates will apply interdisciplinary perspectives to design inclusive, learner-centred, and contextually relevant educational experiences that promote the holistic intellectual, emotional, social, ethical, and creative development of learners.
Generic learning outcomes	The programme aims to prepare passionate, motivated, professionally competent, and ethically responsible teachers equipped to address the diverse learning needs of students at the secondary stage of school education. Graduates will demonstrate the ability to design, implement, assess, and continuously improve developmentally appropriate, inclusive, and competency-based learning experiences using contemporary pedagogical practices and educational technologies. They will exhibit a high level of proficiency in disciplinary knowledge, pedagogical content knowledge, communication, assessment, classroom management, digital literacy, critical thinking, collaboration, and reflective practice. Furthermore, graduates will uphold constitutional values, professional ethics, social responsibility, and a commitment to lifelong learning, thereby contributing effectively to educational excellence, institutional development, and nation-building.

Element of the Descriptor	Programme learning outcomes relating to Undergraduate Certificate ITEP (B.Sc. B.Ed.)
The graduates should be able to demonstrate the acquisition of:	
Knowledge and understanding	- comprehensive knowledge of facts, concepts, principles, theories, and processes across broad multidisciplinary learning contexts within the selected fields of study. - exhibit a clear understanding of the interrelationships and connections among different learning areas, both within individual disciplines and across the chosen multidisciplinary fields of study. - apply the procedural knowledge and practical skills necessary to perform skilled and paraprofessional tasks relevant to the selected fields of learning.
General, technical and professional skills required to perform and accomplish tasks	- range of cognitive and technical competencies required to effectively carry out assigned tasks related to the selected fields of learning within broad multidisciplinary settings. - cognitive abilities to identify, examine, and integrate information collected from a variety of relevant sources. - cognitive and technical competencies necessary to choose and apply appropriate methods, tools, and materials for evaluating the suitability of different approaches to addressing problems associated with the selected fields of learning.
Application of knowledge and skills	apply the acquired theoretical, operational, and technical knowledge, together with a broad range of cognitive and practical skills, to identify, select, and effectively use appropriate methods, tools, materials, and information for developing solutions to specific problems within the chosen fields of learning.
Generic learning outcomes	- demonstrate the ability to listen attentively, critically analyze texts related to the selected fields of study, and communicate information in a clear, precise, and organized manner to diverse groups and audiences. - communicate ideas and viewpoints effectively through both written and oral forms, and present the outcomes and findings of experiments in a clear, concise, and well-structured manner suitable for different groups and audiences. - identify and fulfill personal learning requirements related to the selected fields of study. - engage in self-directed and self-regulated learning to continuously enhance the knowledge and skills necessary for progressing to higher levels of education and professional training.
Constitutional, humanistic, ethical, and moral values	- Demonstrate constitutional, humanistic, ethical, and moral values in personal conduct and apply these principles effectively in real-life situations. - Present well-reasoned and persuasive arguments to address the ethical and moral issues related to the chosen fields of learning.
Employability and job-ready skills, and entrepreneurship skills and capabilities/qualities and	- Demonstrate the knowledge and a comprehensive set of essential skills needed to perform efficiently in a specified profession related to the chosen fields of study. - Exhibit the ability to take responsibility for completing assigned tasks, ensure accountability for the quality and outcomes of one's own work, and contribute responsibly to group assignments and collective outcomes as an active member of a team.

mindset	
Credit Requirements	160 Credits
Entry requirements	Successful completion of 10+2 or equivalent examination from a recognized Board with the minimum eligibility criteria prescribed by the National Council for Teacher Education (NCTE) , the concerned University, and applicable regulatory authorities, including admission through the prescribed selection process.

Semester-I

	Two-Week Student Induction Programme								
Course code	Course Title	Type of Course	L	T	P	Credit	Int.	Ext.	Total Marks
BAD1100	Evolution of Indian Education	Foundation Courses*	4	0	0	4	30	70	100
	Disciplinary/Interdisciplinary Courses: Choose any one List of Major Subjects from (Physics, Chemistry and Mathematics) # Candidate has to study the same major from Sem I to Sem VI								
	Disciplinary Major Courses*								
Course code	Course Title	Type of Course	L	T	P	Credit	Int.	Ext.	Total Marks
BSD1100	Mechanics	Physics (Major)	3	0	0	3	30	70	100
BSD1101	Mathematical Physics		3	0	0	3	30	70	100
BSD1102	Physics Practical-I (Experimental Physics – I)		0	0	2	1	30	70	100
BSD1103	Physics Practical-II (Experimental Physics – II)		0	0	2	1	30	70	100
BSD1104	Inorganic Chemistry-I (Atomic	Chemistry (Major)	3	0	0	3	30	70	100
BSD1105	Organic Chemistry-I (Chemistry of Hydrocarbons and Alkyl Halides)		3	0	0	3	30	70	100
BSD1106	Inorganic Chemistry-I (Practical-I: Volumetric Analysis-I)		0	0	2	1	30	70	100
BSD1107	Organic Chemistry-I(Practical-II: Simple Techniques in Synthesis Lab)		0	0	2	1	30	70	100
BSD1108	Algebra & Trigonometry	Mathematics (Major)	4	0	0	4	30	70	100
BSD1109	Calculus-I		4	0	0	4	30	70	100
Ability Enhancement &Value-Added Courses*									
Anyone of the following language subjects (Punjabi/Hindi/as Language 1									
BAD1117	Punjabi Bhasha, Viharak Vyakaran ate Sabhyachar	Ability Enhancement & Value-Added Courses***	4	0	0	4	30	70	100
BAD1118	Hindi Bhasha ka Vyavaharik Vyakaran evam Lekhan		4	0	0	4	30	70	100
BAD1119	Art Education (Performing and Visual)		2	0	0	2	30	70	100
BAD1120	Understanding India (Indian Ethos and Knowledge Systems		2	0	0	2	30	70	100
	Total					20			

Semester-II

Course code	Course Title	Type of Course	L	T	P	Credit	Int.	Ext.	Total Marks
Disciplinary Major Courses**									
BSD2150	Electricity and Magnetism	Physics (Major)	4	0	0	4	30	70	100
BSD2151	Properties of matter, waves & acoustics		4	0	0	4	30	70	100
BSD2152	Physics Practical-I (Experimental Physics: Magnetism and Oscillations)		0	0	4	2	30	70	100
BSD2153	Physics Practical-II (Experimental Physics: Electricity and Optics)		0	0	4	2	30	70	100
BSD2154	Inorganic Chemistry-II (Chemistry of S, P, D & F Block Elements)	Chemistry (Major)	4	0	0	4	30	70	100
BSD2155	Physical Chemistry-I (States of Matter and Ionic Equilibria)		4	0	0	4	30	70	100
BSD2156	Inorganic Chemistry-II (Practical-I: Qualitative Analysis)		0	0	4	2	30	70	100
BSD2157	Physical Chemistry-I (Practical-II)		0	0	4	2	30	70	100

BSD2158	Differential Equations	Mathematics (Major)	4	0	0	4	30	70	100
BSD2159	Calculus-II		4	0	0	4	30	70	100
BSD2160	Numerical Methods		4	0	0	4	30	70	100
Ability Enhancement & Value- Added Courses * Anyone of the following language subjects (Communicative English/Punjabi/Hindi) as Language 2 (Other than language 1)									
BAD2174	Punjabi Bhasha, Viharak Vyakaran ate Sabhyachar	Ability Enhanceme nt & Value- Added Courses***	4	0	0	4	30	70	100
BAD2175	Hindi Bhasha ka Vyavaharik Vyakaran evam Lekhan		4	0	0	4	30	70	100
BAD2176	Communicative English		4	0	0	4	30	70	100
BAD2177	Teacher and Society		2	0	0	2	30	70	100
BAD2178	Understanding India (Indian Ethos and Knowledge Systems)-II		2	0	0	2	30	70	100
	Total					20			

Semester-III

Course code	Course Title	Type of Course	L	T	P	Credit	Int.	Ext.	
BAD3200	Child development and Educational Psychology	Foundation Courses*	4	0	0	4	30	70	100
	Disciplinary Major Courses**								
BSD3200	Electrodynamics	Physics (Major)	4	0	0	4	30	70	100
BSD3201	Fundamentals Of Optics andLaser		4	0	0	4	30	70	100
BSD3202	Physics Practical-I		0	0	4	2	30	70	100
BSD3203	Physics Practical-II		0	0	4	2	30	70	100
BSD3204	Organic Chemistry-II: (Chemistry of Oxygen and Nitrogen Containing Functional Groups	Chemistry (Major)	4	0	0	4	30	70	100
BSD3205	Physical Chemistry-II (Chemical Thermodynamics and its Applications)		4	0	0	4	30	70	100
BSD3206	Organic Chemistry-II (Practical-I Qualitative Analysis)		0	0	4	2	30	70	100
BSD3207	Physical Chemistry –II (Practical-II Thermochemistry)		0	0	4	2	30	70	100
BSD3208	Analysis and Vector Calculus	Mathematics (Major)	4	0	0	4	30	70	100
BSD3209	Partial Differential Equations		4	0	0	4	30	70	100
BSD3210	Graph Theory		4	0	0	4	30	70	100
Stage-Specific Content-cum-Pedagogy Course*									
BAD3225	Basics of Pedagogy at Secondary Stage*		4	0	0	4	30	70	100
	Total					20			

Semester-IV

Course code	Course Title	Type of Course	L	T	P	Credit	Int.	Ext.	Total Marks
BAD4250	Philosophical and Sociological Perspective of Education-I	Foundation of Education*	4	0	0	4	30	70	100
Disciplinary Major Courses**									
BSD4250	Quantum Mechanics	Physics (Major)	4	0	0	4	30	70	100
BSD4251	Computational Physics		4	0	0	4	30	70	100
BSD4252	Physics Practical-I		0	0	4	2	30	70	100
BSD4253	Physics Practical-II		0	0	4	2	30	70	100
BSD4254	Inorganic Chemistry-III(Coordination Chemistry)	Chemistry (Major)	4	0	0	4	30	70	100
BSD4255	Organic Chemistry–III Chemistry of Biomolecules		4	0	0	4	30	70	100
BSD4256	Inorganic Chemistry-III (Practical-I Volumetric Analysis-II)		0	0	4	2	30	70	100
BSD4257	Organic Chemistry III (Practical-II Quantitative Analysis)		0	0	4	2	30	70	100

BSD4258	Abstract Algebra	Mathematics (Major)	4	0	0	4	30	70	100
BSD4259	Analytical and Solid Geometry		4	0	0	4	30	70	100
BSD4260	Complex Analysis		4	0	0	4	30	70	100
Stage-Specific Content-cum-Pedagogy Courses (Any one as per the major subject)									
BSD4261	Pedagogy of Physics-I		4	0	0	4	30	70	100
BSD4262	Pedagogy of Chemistry-I		4	0	0	4	30	70	100
BSD4263	Pedagogy of Mathematics-I		4	0	0	4	30	70	100
	Total					20			

Semester-V

Course code	Course Title	Type of Course	L	T	P	Credit	Int	Ext	Total Marks
	Disciplinary Major Courses*								
BSD5300	Solid State Physics and Spectroscopy	Physics (Major)	4	0	0	4	30	70	100
BSD5301	Electronics (Analog & Digital)		4	0	0	4	30	70	100
BSD5302	Physics Practical-I		0	0	4	2	30	70	100
BSD5303	Physics Practical-II		0	0	4	2	30	70	100
BSD5304	Inorganic Chemistry-IV (Organo metallic and Reaction Mechanisms)	Chemistry (Major)	4	0	0	4	30	70	100
BSD5305	Physical Chemistry-II (Quantum Chemistry)		4	0	0	4	30	70	100
BSD5306	Inorganic Chemistry-IV (Practical-I Gravimetric Analysis)		0	0	4	2	30	70	100
BSD5307	Physical Chemistry III: (Practical-II)		0	0	4	2	30	70	100
BSD5308	Ring Theory and Laplace Transform	Mathematics (Major)	4	0	0	4	30	70	100
BSD5309	Statics and Dynamics		3	1	0	4	30	70	100
BSD5310	Probability and Statistics		4	0	0	4	30	70	100
Stage-Specific Content-cum-Pedagogy Courses (Any one as per the major subject)									
BSD5311	Pedagogy of Physics-II	Stage-Specific Content-cum-Pedagogy	4	0	0	4	30	70	100
BSD5312	Pedagogy of Chemistry-II		4	0	0	4	30	70	100
BSD5313	Pedagogy of Mathematics-II		4	0	0	4	30	70	100
Ability Enhancement & Value-Added Courses*									
BAD5332	ICT in Education		1	0	1	2	30	70	100
School Experiences*									
BAD5333	Pre-Internship Practice (Demonstration Lessons and Peer Teaching)		0	0	4	2	30	70	100
	Total					20			

Semester-VI

Course code	Course Title	Type of Course	L	T	P	Credit	Int.	Ext.	Total Marks
BAD6350	Assessment and Evaluation	Foundations of Education	2	0	0	2	30	70	100
BAD6351	Inclusive Education		2	0	0	2	30	70	100
Disciplinary Major Courses*									
BSD6350	Thermal and Statistical Physics	Physics (Major)	3	0	0	3	30	70	100
BSD6351	Nuclear and Particle Physics		3	0	0	3	30	70	100
BSD6352	Physics-I Lab.		0	0	2	1	30	70	100
BSD6353	Physics-II Lab.		0	0	2	1	30	70	100
BSD6354	Organic Chemistry-IV (Chemistry of Heterocyclic Compounds and Natural Products)	Chemistry (Major)	3	0	0	3	30	70	100
BSD6355	Physical Chemistry-IV (Electrochemistry, Phase equilibria & Properties of Solutions)		3	0	0	3	30	70	100
BSD6356	Organic Chemistry-IV:(Practical-I Preparation of Organic Compounds)		0	0	2	1	30	70	100
BSD6357	Physical Chemistry-IV: (Practical-II)		0	0	2	1	30	70	100
BSD6358	Linear Algebra	Mathematics (Major)	4	0	0	4	30	70	100
BSD6359	Number Theory		4	0	0	4	30	70	100
	Stage-Specific Content-cum-Pedagogy Courses (Any one as per the major subject)								
BSD6360	Pedagogy of Physics-IV	Stage-Specific Content-cum-Pedagogy Courses	4	0	0	4	30	70	100
BSD6361	Pedagogy of Chemistry-IV		4	0	0	4	30	70	100
BSD6362	Pedagogy of Mathematics-IV		4	0	0	4	30	70	100
	Ability Enhancement& Value-Added Courses*								
BAD6376	Mathematical & Quantitative Reasoning		2	0	0	2	30	70	100
	School Experiences*								
BAD6377	School Observation (Field Practice)***		0	0	0	2	30	70	100
	Total					20			

Semester-VII

Course code	Course Title	Type of Course	L	T	P	Credit	Int.	Ext.	Total Marks
BAD7400	Perspectives on School Leadership and Management	Foundations of Education	2	0	0	2	30	70	100
BAD7401	Curriculum Planning and Development (Textbooks, material development etc.) Stage Specific		2	0	0	2	30	70	100
BAD7402	Art Education (Performing and Visual)-II	Ability Enhancement & Value-Added Courses	2	0	0	2	30	70	100
BAD7403	Sports Nutrition and Fitness		2	0	0	2	30	70	100
BAD7404	School-Based ResearchProject	School Experiences	0	0	4	2	30	70	100
BAD7405	Internship inTeaching		0	0	0	10	30	70	100
	Total					20			

Semester-VIII

Course code	Course Title	Type of Course	L	T	P	Credit	Int.	Ext.	Total Marks
BAD8450	Philosophical and Sociological perspectives of Education-II	Foundations of Education	4	0	0	4	30	70	100
BAD8451	Education Policy Analysis		2	0	0	2	30	70	100
BAD8452	Guidance and Counselling		4	0	0	4	30	70	100
BAD8453	Yoga and Understanding Self	Ability Enhancement & Value Added Courses	2	0	0	2	30	70	100
BAD8454	Citizenship Education, Sustainability		2	0	0	2	30	70	100
BAD8455	Post Internship (Review & Analysis)	School Experiences	0	0	2	2	30	70	100
BAD8456	Creating Teaching Learning Material/ Work Experience		0	0	2	2	30	70	100
	Community Engagement and Service						30	70	100
BAD8457	Community Engagement and Services (Participation in NSS-related Activities, New India Literacy Programme)		0	0	2	2	30	70	100
	Total					20			

SEMESTER-I

Foundation Courses

Course Title: Evolution of Indian Education

Course Code: BAD1100

L	T	P	Credits
4	0	0	4

Total Hours: 60

Course Learning Outcomes: After completion of this course, the learner will be able to:

- 1) To develop an understanding among student teachers of the meaning of education and education during ancient period in India
- 2) To orient student teachers to the historical perspective of Indian education during Islamic period
- 3) To develop an understanding of education development in India during colonial period
- 4) To provide an over view of the evolution of education during post-independence period

Course Content

Unit I

15 Hours

Meaning, nature and scope of education, Aims of education- Individual and social, Agencies of Education- Informal, formal and non-formal, Ancient Indian Education: Salient features of Vedic, Buddhist and Jain Education System.

Unit II

15 Hours

Meaning, nature and scope of education, Aims of education- Individual and social, Agencies of education- Informal, formal and non-formal, Ancient Indian Education: Salient features of Vedic, Buddhist and Jain Education System

Unit III

15 Hours

Colonial Education in India: Macaulay Minutes, Woods Despatch, Contribution of Indian thinkers: Mahatma Gandhi, Sri Aurobindo Rabindranath Tagore,

Unit IV

15 Hours

Education in Independent India, Overview of Constitutional values and educational Provisions, Features of Mudaliar Commission 1952-53, Kothari commission 1964-66, NPE-1986, NEP 2020

Suggestive Mode of Transaction

The course content transaction will include the following; CLO4 Planned lectures infused with multimedia/PowerPoint presentations. Small group discussion, panel interactions, small theme-based seminars, cooperative teaching, and team teaching, focus group discussion, surveys, short term project work, etc.

Suggestive Reading Materials

- Bhatia and Narang: Philosophical & Sociological Foundations Education Doaba House, New Delhi, 1992.

- Dash, B.N: Foundations of Education, Kalyani Publishers 14 15
- Saxena, N.R.S.: Principles of Education • Govt. of India Ministry Report of Secondary Education Commission (1952–53).
- Prasad and Chandra: Sociological Foundations of Education, Deepak KSK Publishers, Delhi, 2006
- Sodhi, T.S. Philosophical and Sociological Foundations of Education, Bawa Publications, Patiala, 2007 • Taneja, V.R. Foundation of Education, Chandigarh, Mahindra Capital, Punjab, 2006.

PHYSICS (MAJOR)

Course Title: Mechanics

Course Code: BSD1100

L	T	P	Credits
3	0	0	3

Total Hours: 45

Course Learning Outcomes: After completion of this course, the learner will be able to:

- 1) Enhance their knowledge regarding Cartesian and spherical polar coordinate systems and, the relationship of conservation laws.
- 2) Understand various forces in nature and Kepler Laws.
- 3) Acknowledge them Galilean transformation and Invariance and Foucault pendulum.
- 4) Enrich them with Elastic collision in Lab and C.M. system and Rotational motion.

Course Content

Unit I

13 Hours

1. Frames of reference

Laws of Mechanics, Inertial frames of reference, Galilean transformation equations, Hypothesis of Galilean invariance, Conservation of Momentum, Non inertial frames and fictitious forces, Rotating frames of reference, Centrifugal force and Coriolis force, Foucault's pendulum

(Section 2.1 to 2.11 of Mechanics by J C Upadhyaya)

2. Conservation of Energy

Conservation laws, Conservative forces, Conservation of energy for a particle: Energy function, Potential energy curve, Non conservative forces

(Section 5.1 to 5.7, 5.10, 5.11 of Mechanics by J C Upadhyaya)

Unit II

12 Hours

3. Linear and Angular Momentum

Conservation of linear momentum, Centre of mass, , Centre of mass frame of reference, Collision of two particles, Deflection of a moving particle by a particle at rest, Rockets, Angular momentum and torque, Motion under central force, Areal velocity, Conservation of angular momentum with examples

(Section 6.1 to 6.4, 6.6 to 6.9 of Mechanics by J C Upadhyaya)

4. Potentials and Fields

Central force, Inverse-square law force, Potential energy of a system of masses, Gravitational field and

potential, Escape velocity, Kepler's laws, Newton's deductions from Kepler's laws
(Section 7.1 to 7.4, 7.6 to 7.9, 7.18, 7.19 of Mechanics by J C Upadhyaya)

Unit III

8 Hours

5. Lagrangian formulations of Classical Mechanics

Constraints, Generalized co-ordinates, Principle of virtual work, D'Alembert's principle, Lagrange's equations, Kinetic energy in generalized co-ordinates, Generalized momentum, Cyclic co-ordinates, Conservation laws and symmetry properties-Hamiltonian of a system

Unit IV

12Hours

6. Special Theory of Relativity

Electromagnetism and Galilean transformation, Michelson Morley experiment, Ether hypothesis, Postulates of Special Theory of Relativity, Lorentz transformation equations, Velocity transformation, Length contraction, Time dilation, Simultaneity, Mass in relativity, Mass and energy, Space-time diagram, Geometrical interpretation of Lorentz transformation, Principle of covariance, Four-vectors in Mechanics

Suggestive Mode of Transaction

The course content transaction will include the following:

Planned lectures infused with multimedia/PowerPoint presentations. Small group discussion, panel interactions, small theme-based seminars, cooperative teaching, and team teaching, selections from theoretical readings, flipped learning, blended learning, demonstration, laboratory method

Textbooks for Study

- 1) Mechanics by J C Upadhyaya
- 2) Classical Mechanics by Takwale and Puranik
- 3) Classical Mechanics by Hans and Puri
- 4) Classical Mechanics by J C Upadhyaya

Reference books

- 1) Mechanics by D.S.Mathur
- 2) Classical Mechanics by Goldstein
- 3) Berkeley Physics course Vol 1
- 4) Feynman Lectures on Physics Vol 1
- 5) Elements of Mechanics – K Rama Reddy, S Raghavan & D V N Sarma- Universities Press
- 6) Introduction to Mechanics – Mahendra K Verma – Universities Press

PHYSICS (MAJOR)

Course Title: Mathematical Physics

Course Code: BSD1101

L	T	P	Credits
3	0	0	3

Total Hours: 45

Course Learning Outcomes: After completion of this course, the learner will be able to:

- 1) Comprehend scalar and vector fields - gradient of a scalar function
- 2) Analyse special functions - beta and gamma functions - definitions - symmetry property of beta function
- 3) Reflect upon special types of matrices - symmetric and skew-symmetric matrices
- 4) Comprehend complex variables and fourier series

Course Content

Unit I

10 Hours

VECTOR CALCULUS

Scalar and Vector Fields - Gradient of a Scalar function - Divergence of a Vector function - Curl - Line Integral, Surface Integral and Volume Integral (Simple Problems) - Gauss Divergence Theorem - Stoke's Theorem and Green's Theorem (Statement and Proof)- Spherical Polar Coordinates - Expressions for Gradient, Divergence, Curl and Laplacian Operator in Cartesian and Spherical Polar Coordinates.

Unit II

10 Hours

SPECIAL FUNCTIONS

Special Functions-Beta and Gamma Functions-Definitions-Symmetry Property of Beta function - Evaluation of Integrals using Beta function - Transformation of Beta function - Evaluation of Gamma Function - The value of $\Gamma(1/2)$ - Transformations of Gamma function (Other forms) - Relation between Beta and Gamma functions - Simple Problems in beta and gamma functions-Series Solutions for Bessel, Legendre and Hermite Differential Equations.

Unit III

10 Hours

MATRICES

Special Types of Matrices - Symmetric and Skew-symmetric Matrices - Hermitian and Skew Hermitian Matrices - Orthogonal Matrices - Unitary Matrices -Properties - Characteristics Equation - Determination of Eigen values and Eigen vectors - Properties - Statement and Proof of Cayley – Hamilton Theorem-Simple Problems-Inverse of Matrix by CH Theorem-Diagonalization of 2x2 Real Symmetric Matrices.

Unit IV

15Hours

COMPLEXVARIABLES

Basics of Complex Numbers and their Graphical Representation-Euler's Formula, De-Moivre's Theorem-
Functions of Complex Variables-Limit, Continuity and Differentiability-Analytic Function-Definition-Cauchy-
Riemann Conditions - Examples of Analytic Functions (Analyticity) - Cauchy-Riemann Conditions in Polar
Form

FOURIER SERIES

Fourier Series in the interval $(-\pi \text{ to } \pi)$ -Definition-Dirichlet's Conditions (Statement Only) -Determination of
Fourier Coefficients -Even and Odd Functions and their Fourier expansions. Sine and Cosine Periodic
Functions-Simple Problems in Fourier Series in the interval $(-\pi \text{ to } \pi)$ -
Applications of Fourier series-Half Wave Rectifier and Saw Tooth Wave.

PHYSICS (MAJOR)

Course Title: Physical Practical-I (Experimental Physics – I)

Course Code: BSD1102

L	T	P	Credits
0	0	2	1

Total Hours: 15

Course Learning Outcomes: : After completion of this course, the learner will be able to:

1. Perform experiments to determine the mechanical properties of materials, including Young's modulus using different bending methods.
2. Measure and analyze surface tension and viscosity of liquids using standard experimental techniques.
3. Determine the moment of inertia of a flywheel and interpret the principles governing rotational motion.
4. Develop laboratory skills in observation, data collection, error analysis, graph plotting, and interpretation of experimental results.

Course Content

- 1) Young's modulus-non uniform bending-using pin and microscope-(load-extension graph).
- 2) Young's modulus-uniform bending-using optic lever
- 3) Young's modulus-Angle between the tangents
- 4) Surface Tension-capillary rise method-radius by vernier microscope
- 5) Viscosity-Poiseuille's method –(Variable Pressure head, radius by mercury pellet method, sensibility method to find mass)
- 6) Moment of inertia-Flywheel

PHYSICS (MAJOR)

Course Title: Physics Practical-II (Experimental Physics – II)

Course Code: BSD1103

L	T	P	Credits
0	0	2	1

Total Hours: 15

Course Learning Outcomes: After completion of this course, the learner will be able to:

1. Determine the moment of inertia, rigidity modulus, and acceleration due to gravity using standard experimental methods.
2. Apply the principles of oscillations and rotational mechanics through experiments involving torsion and compound pendulums.

3. Measure the refractive index and dispersive power of optical materials using liquid lenses and spectrometers.
4. Develop proficiency in experimental techniques, data analysis, error estimation, and interpretation of physical phenomena in laboratory settings.

Course Content

- 1) Moment of Inertia-Torsion Pendulum
- 2) Rigidity modulus-static torsion
- 3) Compound pendulum acceleration due to gravity, Radius of gyration
- 4) Liquid lens-Refractive index of liquid and glass
- 5) Spectrometer-solid prism-Refractive index of glass measuring angle of minimum deviation.
- 6) Spectrometer-solid prism- Dispersive power

CHEMISTRY (MAJOR)

Course Title: Inorganic Chemistry-I (Atomic Structure and Chemical Bonding)

Course Code: BSD1104

L	T	P	Credits
3	0	0	3

Total Hours: 45

Course Learning Outcomes: After completion of this course, the learner will be able to:

- 1) Develop understanding for the concepts of structure and bonding.
- 2) Appreciate the variation in the different types of structure and bonding exhibited by inorganic compounds.
- 3) Enrich their factual knowledge of chemistry related to ionic and covalent compounds.
- 4) Analyse the implications of Lewis theory, Valence bond theory

Course Content

Unit I

11 Hours

Atomic Structure and Chemical Periodicity:

- a. The origin and distribution of the elements, The structure of the periodic table, The de Broglie relationship, The uncertainty principle, Schrodinger wave equation and its derivation, Energy quantization, Significance of wave function. The Born interpretation, Quantum numbers, Normal and orthogonal wave functions.
- b. Radial and angular probability distribution curves, the building up principle in many electron atoms, Penetration and shielding (The Slater's rules), Atomic parameters and their variation in periodic table, Electronegativity and various scales, Variation of electronegativity with partial charges and hybridization, Electro neutrality principle, Hardness and softness, Perturbation theory.

Unit II

11 Hours

Ionic Compounds-I:

- a. Concept of close packing and ionic structures, Properties of ionic substances, Occurrence of ionic bonding, the radius ratio rules, Efficiency of packing, Hexagonal close packing, Cubic close packing,
- b. Structures of different crystal lattices, Sodium chloride, Cesium chloride, Wurtzite, Zinc blende, Fluorite, Rutile, Cristobalite, Nickel arsenide, Pervoskite, Rhenium oxide, Calcium carbide, The calcite and aragonite structures.

Unit III

11 Hours

Ionic Compounds-II:

- a. Lattice energy, Born-Haber cycle, the calculations of the lattice energy on the basis of Born-Lande equation, The predictive power of thermochemical calculations on ionic compounds.
- b. Covalent character in predominantly ionic compounds, Imperfections of crystals, Conductivity in ionic

solids, Band theory, Intrinsic and photo excited semiconductors, Transistors, High temperature superconductors.

Unit IV

12Hours

The Covalent Bond:

- a. The Lewis theory, Valence bond theory - A mathematical approach, Resonance, Valence Shell Electron Pair Repulsion Model (VSEPR theory), Prediction of structures and variation of bond angles on the basis of VSEPR theory, Shortcomings of VSEPR theory.
- b. Concept of hybridization, Rules for obtaining hybrid orbitals, Extent of d orbital participation in molecular bonding (SO₂, PCl₅, SO₃), Molecular orbital theory (LCAO method), Symmetry of molecular orbitals, Applications of MOT to homo- and hetero-nuclear diatomic molecules, Molecular orbital energy level diagrams (Be₂, N₂, O₂, F₂, LiH, NO, CO, HCl, NO₂, BeH₂, NO₂).

Suggestive Mode of Transaction

The course content transaction will include the following:

Planned lectures infused with multimedia/PowerPoint presentations. Small group discussion, panel interactions, small theme-based seminars, cooperative teaching, and team teaching, flipped learning, blended learning, demonstration, laboratory method

Suggested Readings

- D. F. C. Shriver, P. W. Atkins and C. H. Langford, Inorganic Chemistry, ELBS Oxford, 1991.
- J. E. Huheey, E.A. Keiter, R. L. Keiter, Inorganic Chemistry, 4th Ed, Pearson Education, Singapore, 1999.
- J. D. Lee, Concise Inorganic Chemistry, ELBS, Oxford 1994.
- Cotton, F.A., Wilkinson, G., Gaus, P.L., Basic Inorganic Chemistry; 3rd edition, Pubs: John Wiley Sons. 1995.
- Lee, J.D., Concise Inorganic Chemistry; 4th edition, Pubs: Chapman Hall Ltd., 1991.
- Shriver, D.E., Atkins, P.W., Langford, C.H., Inorganic Chemistry; 4th edition, Oxford Publisher: Oxford University Press, 2006.
- Douglas, B. McDaniel, D., Alexander, J., Concepts and Models of Inorganic Chemistry; 3rd edition, Pubs: John Wiley and Sons Inc., 1994.
- Miessler, G.L., Larr, D.A., Inorganic Chemistry; 3rd edition, Pubs: Pearson Education Inc., 2004.
- Jolly, W.L., Modern Inorganic Chemistry; 2nd edition, Pubs: McGraw-Hill Publishing, Company Limited, 1991.

- Purcell, K.F., Kotz, J.C., Inorganic Chemistry; Pubs: W.B. Saunders Company, 1977.
- Puri, B.R., Sharma, L.R., Kalia, K.C., Principles of Inorganic Chemistry; 30th edition, Pubs: Milestones Publisher, 2006-07.
- University General Chemistry, C.N.R. Rao, Macmillan.
- Inorganic Chemistry, W.W. Porterfield Addison-Wesley.
- Inorganic Chemistry, A.G. Sharpe, ELBS.

CHEMISTRY (MAJOR)

Course Title: Organic Chemistry-I (Chemistry of Hydrocarbons and Alkyl Halides)

Course Code: BSD1105

L	T	P	Credits
3	0	0	3

Total Hours: 45

Course Learning Outcomes: After completion of this course, the learner will be able to:

1. To introduce the fundamental concepts of organic chemistry, including the structure, classification, and properties of aliphatic and aromatic hydrocarbons.
2. To develop an understanding of stereochemistry and its significance in the structure and behavior of organic compounds.
3. To explain the principles of organic reaction mechanisms, reactive intermediates, and the factors influencing organic reactions.
4. To provide knowledge of the methods of preparation, properties, and reactions of alkanes, cycloalkanes, alkenes, alkynes, aromatic compounds, alkyl halides, and their derivatives.

Course Content

Unit I

11 Hours

Basics of Organic Chemistry

- a. Organic Compounds: Classification, and Nomenclature, Hybridization, Shapes of molecules, Influence of hybridization on bond properties.
- b. Electronic Displacements: Inductive, Electromeric, resonance and Mesomeric effects, hyper conjugation and their applications; Dipole moment; Organic acids and bases; their relative strength..
- c. Homolytic and Heterolytic fission with suitable examples. Curly arrow rules, formal charges; Electrophiles and Nucleophiles; Nucleophilicity and basicity; Types, shape and their relative stability of Carbocations, Carbanions, Free radicals and Carbenes. Introduction to types of organic reactions and their mechanism: Addition, Elimination and Substitution reactions.
- d. Stereochemistry: Fischer Projection, Newmann and Sawhorse Projection formulae and their interconversions; Geometrical isomerism: cis-trans and, syn-anti isomerism E/Z notations with C.I.P rules.
- e. Optical Isomerism: Optical Activity, Specific Rotation, Chirality/Asymmetry, Enantiomers, Molecules with two

or more chiral-centres, Distereoisomers, meso structures, racemic mixture and resolution. Relative and absolute configuration: D/L and R/S designations.

Unit II

11 Hours

Chemistry of Aliphatic Hydrocarbons

- a. Carbon-Carbon sigma bonds: Chemistry of alkanes: Formation of alkanes, Wurtz Reaction, Wurtz-Fittig Reactions, Free radical substitutions: Halogenation -relative reactivity and selectivity.
- b. Cycloalkanes and Conformational Analysis: Types of cycloalkanes and their relative stability, Baeyer strain theory, Conformation analysis of alkanes: Relative stability: Energy diagrams of cyclohexane: Chair, Boat and Twist boat forms; Relative stability with energy diagrams.
- c. Carbon-Carbon pi bonds: Formation of alkenes and alkynes by elimination reactions, Mechanism of E1, E2, E1cb reactions. Saytzeff and Hofmann eliminations.
- d. Reactions of alkenes: Electrophilic additions their mechanisms (Markownikoff/ Anti Markownikoff addition), mechanism of oxymercuration-demercuration, hydroboration-oxidation, ozonolysis, reduction (catalytic and chemical), syn and anti- hydroxylation (oxidation). 1,2 and 1,4 addition reactions in conjugated dienes and Diels-Alder reaction; Allylic and benzylic bromination and mechanism, e.g. propene, 1-butene, toluene, ethyl benzene.
- e. Reactions of alkynes: Acidity, Electrophilic and Nucleophilic additions. Hydration to form carbonyl compounds, Alkylation of terminal alkynes.

Unit III

11 Hours

Chemistry of Aromatic Hydrocarbons

- a. Aromaticity: Hückel's rule, aromatic character of arenes, cyclic carbocations/carbanions and heterocyclic compounds with suitable examples. Electrophilic aromatic substitution: halogenation, nitration, sulphonation and Friedel-Craft's alkylation/acylation with their mechanism. Directing effects of the groups.
- b. Polynuclear Hydrocarbons: Reactions of naphthalene phenanthrene and anthracene Structure, Preparation and structure elucidation and important derivatives of naphthalene and anthracene; Polynuclear hydrocarbons.

Unit IV

12 Hours

Chemistry of Halogenated Hydrocarbons

- a. Alkyl halides: Methods of preparation, nucleophilic substitution reactions – SN1, SN2 and SNi mechanisms with stereochemical aspects and effect of solvent etc.; nucleophilic substitution vs. elimination.
- b. Aryl halides: Preparation, including preparation from diazonium salts. Nucleophilic aromatic substitution; SNAr, Benzyne mechanism. Relative reactivity of alkyl, allyl/benzyl, vinyl and aryl halides towards

nucleophilic substitution reactions. Organometallic compounds of Mg and Li – Use in synthesis of organic compounds.

Suggestive Mode of Transaction

The course content transaction will include the following;

Planned lectures infused with multimedia/PowerPoint presentations. Small group discussion, panel interactions, small theme-based seminars, cooperative teaching, and team teaching, flipped learning, blended learning, demonstration, laboratory method

Suggested Readings

- Morrison, R. N. & Boyd, R. N. Organic Chemistry, Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
- Finar, I. L. Organic Chemistry (Volume 1), Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
- Finar, I. L. Organic Chemistry (Volume 2: Stereochemistry and the Chemistry of Natural Products), Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
- Eliel, E. L. & Wilen, S. H. Stereochemistry of Organic Compounds, Wiley: London, 1994.
- Kalsi, P. S. Stereochemistry Conformation and Mechanism, New Age International, 2005.
- McMurry, J.E. Fundamentals of Organic Chemistry, 7th Ed. Cengage Learning India Edition, 2013.
- Solomons, T.W., Fryhle, C.B., Organic Chemistry; 9th edition, Pubs: Wiley India, 2007.
- Wade Jr., L.G., Singh, M.S., Organic Chemistry; 6th edition, Pubs: Pearson education, 2008.
- Fundamentals of Organic Chemistry, Solomons, John Wiley.
- Introduction to Organic Chemistry, Sireitwieser, Heathcock and Kosover, Macmillan.

Course Title: Inorganic Chemistry-I (Volumetric Analysis-I- Practical-I)

Course Code: BSD1106

L	T	P	Credits
0	0	2	1

Total Hours: 45

Course Learning Outcomes: After completion of this course, the learner will be able to:

- 1) Provide a positive, enjoyable learning experience based on sound scientific principles and practice.
- 2) Foster good laboratory practice and develop technical skills relevant to quantitative analysis.
- 3) Provide an environment which encourage an inquiring, investigate approach, developing competence and confidence
- 4) Supplement and reinforce chemical principles taught in the theory units.

Course Content

Unit I

Titrimetric Analysis

- a. Calibration and use of apparatus
- b. Preparation of solutions of different Molarity/Normality of titrants

Unit II

Acid-Base Titrations

- a. Estimation of carbonate and hydroxide present together in mixture.
- b. Estimation of carbonate and bicarbonate present together in a mixture.
- c. Estimation of free alkali present in different soaps/detergents

Unit III

Oxidation-Reduction Titrimetric

- a. Estimation of Fe(II) and oxalic acid using standardized KMnO_4 solution.
- b. Estimation of oxalic acid and sodium oxalate in a given mixture.
- c. Estimation of Fe (II) with $\text{K}_2\text{Cr}_2\text{O}_7$ using internal (diphenylamine, anthranilic acid) and external indicator.

Unit IV

Iodo/Iodimetric Titrations

- a. Estimation of Cu (II) and using $\text{K}_2\text{Cr}_2\text{O}_7$ sodium thiosulphate solution (Iodimetrically).
- b. Estimation of (a) arsenite and (b) antimony in tartar-emetic iodimetrically
- c. Estimation of available chlorine in bleaching powder iodometrically

Suggested Reading:

- Mendham, J., A. I. Vogel's Quantitative Chemical Analysis 6th Ed., Pearson, 2009.
- Vogel's Qualitative Inorganic Analysis, revised, Svehla, Orient Longman.
- Experimental Inorganic Chemistry, W.G. Palmer, Cambridge. Standard Methods of Chemical Analysis, W.W. Scott: The Technical Press.
- Laboratory Manual in Organic Chemistry, R.K. Bansal, Wiley Eastern.
- Vogel's Textbook of Practical Organic Chemistry, B.S. Furniss, A.J. Hannaford,
- V. Rogers, P.W.G. Smith and A.R. Tatchell, ELBS.
- Experiments in General Chemistry, C.N.R. Rao and U.C. Aggarwal, East-West Press

Course Title: Organic Chemistry-I (Simple Techniques in Synthesis Lab- Practical-II)

Course Code: BSD1107

L	T	P	Credits
0	0	2	1

Total Hours: 45

Course Learning Outcomes: After completion of this course, the learner will be able to:

1. Provide a positive, enjoyable learning experience based on sound scientific principles and practicals.
2. Foster good laboratory practice and develop technical skills relevant to quantitative analysis.
3. Provide an environment which encourage an inquiring, investigate approach, developing competence and confidence
4. Supplement and reinforce chemical principles taught in the theory units.

Course Content

- Checking the calibration of the thermometer
- Purification of organic compounds by crystallization using the following solvents
(i) Water (ii) Alcohol (iii) Alcohol-Water
- Determination of the melting points of above compounds and unknown organic compounds (Kjeldahl method and electrically heated melting point apparatus)
- Effect of impurities on the melting point – mixed melting point of two unknown organic compounds
- Determination of boiling point of liquid compounds. (Boiling point lower than and more than 100°C by distillation and capillary method)
- Chromatography
- Separation of a mixture of two amino acids by ascending and horizontal paper chromatography
- Separation of a mixture of two sugars by ascending paper chromatography
- Separation of a mixture of o- and p-nitrophenol or o- and p-aminophenol by thin layer chromatography (TLC) and column chromatography.
- Detection of nitrogen, halogens and sulphur in organic compounds.

Suggested Readings

- Mann, F.G. & Saunders, B.C. *Practical Organic Chemistry*, Pearson Education (2009)
- K.B. Dutta: *Matrix and Linear Algebra*, Prentice Hall of India Pvt. Ltd., New Delhi (2002).
- H.S. Hall and S.R. Knight: *Higher Algebra*, H.M. Publications, 1994.
- Chandrika Parsad: *Text book on Algebra and Theory of Equations*, Pothishala Pvt. Ltd., Allahabad.
- S.L. Loney: *Plane Trigonometry Part-II*, Macmillan and Company, London.
- Shanti Narayan and P.K. Mittal: *Text Book of Matrices*.

MATHEMATICS (MAJOR)

Course Title: Algebra and Trigonometry

Course Code: BSD1108

L	T	P	Credits
4	0	0	4

Total Hours: 45

Course Learning Outcomes: After completion of this course, the learner will be able to:

1. Understand exponential and logarithmic function of a complex variable and De-Moivre's theorem.
2. Comprehend linear independence of row and column vectors.
3. Comprehend Eigen values, Eigen vectors, minimal and the characteristic equation of a matrix
4. Analyze Congruence of quadratic forms and matrices.

Course Content

Unit I

11 Hours

- a. Exponential and Logarithmic function of a complex variable.
- b. Expansion of trigonometric functions, Gregory's series, Summation of series.
- c. De-Moivre's theorem and its applications, circular & hyperbolic functions and their inverses.

Unit II

11 Hours

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

Unit III

11 Hours

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

Unit IV

12 Hours

- a. 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.

b. Reduction in the real field. Classification of real quadratic forms in n variables. Definite, semi-definite and indefinite real quadratic forms. Characteristic properties of definite, semi-definite and indefinite forms.

Suggestive Mode of Transaction

The course content transaction will include the following;

Planned lectures in fused with multimedia/Power Point presentations. Small group discussion, panel interactions, small theme-based seminars, cooperative teaching, and team teaching, flipped learning, blended learning, demonstration, laboratory method

Suggested Readings:

- K.B.Dutta: Matrix and Linear Algebra, Prentice Hall of India Pvt.Ltd., New Delhi (2002)
- H.S.Hall and S.R.Knight: Higher Algebra, H.M. Publications, 1994.
- Chandrika Parsad: Text book on Algebra and Theory of Equations, Pothishala Pvt.Ltd., Allahabad.
- S.L.Loney: Plane Trigonometry Part-II, Macmillan and Company, London.
- Shanti Narayan and P.K. Mittal: Text Book of Matrices.

MATHEMATICS (MAJOR)

Course Title: Calculus-I

Course Code: BSD1109

L	T	P	Credits
4	0	0	4

Total Hours: 45

Course Learning Outcomes: After completion of this course, the learner will be able to:

- 1) Understand real number system and its properties.
- 2) Comprehend different successive differentiation theorems.
- 3) Increase their knowledge regarding Maxima and Minima of functions of single variable.
- 4) Comprehend asymptotes, tests for concavity and convexity.

Course Content

Unit I

18 Hours

Real number system and its properties, lub, glb of sets of real numbers, limit of a function, Basic properties of limits.

b. Continuous functions and classification of discontinuities, Uniform continuity, Differentiability of real valued functions of one variable, Differentiation of hyperbolic functions.

Unit II

11 Hours

Successive differentiation, Leibnitz theorem. b. Roll's theorem, mean value theorems & applications, Intermediate value theorems for derivatives, Taylor's and Maclaurin's theorem, Indeterminate forms.

Unit III

Hours 15

Maxima and Minima of functions of single variable, Asymptotes, Tangent and normal curvature of curves, radius of curvature.

Unit IV

13Hours

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

Suggestive Mode of Transaction

The course content transaction will include the following;

Planned lectures infused with multimedia/PowerPoint presentations. Small group discussion, panel interactions, small theme-based seminars, cooperative teaching, and team teaching, flipped learning, blended learning, demonstration, laboratory method

Suggested Readings:

- N. Piskunov: Differential and Integral Calculus, Peace Publishers, Moscow.
- Tom M. Apostol: Calculus: An Indian Adaptation, Wiley India, 2023
- Erwin Kreyszig: Advanced Engineering Mathematics, John Wiley and Sons, 1999

Course Title: Punjabi

Course Code: BAD1117

L	T	P	Credits
4	0	0	4

Course Outcomes:

ਇਸਕੋਰਸਨੂੰ ਪਾਸਕਰਨ ਉਪਰੰਤ ਵਿਵਿਧ ਆਰਥੀ ਇਸ਼ੇਯੋਗ ਹੋ ਜਾਣਗੇ।

1. ਵਿਵਿਧ ਆਰਥੀਆਂ ਨੂੰ ਵਨ ਬੁੰਧ ਜਾਂ ਲੇਖ ਵਲ ਖਣੀ ਜਾਂ ਚਹਾਵ ਸਲ ਹੋਂਦੇਗੀ
2. ਵਨਿੱਜੀ ਵਚਿੱਠੀ ਪਿੱਤਰ ਬਾਰੇ ਜਾਣਕਾਰੀ ਹਾਵ ਸਲ ਕਰਕੇ ਵਿਹਾਵਰ ਕਜੀਂ ਨਿਵਿੱਚ ਲਾਗ ਕਰਨਗੇ
3. ਪੂੰਜਾਬੀ ਭਾਸ਼ਾ ਵਿੱਚ ਆਉ ਪਭਾਸ਼ਾ ਵਿੱਚ ਆਂਬਾਰੇ ਜਾਣਕਾਰੀ ਪਰਾਪਤ ਕਰਨਗੇ
4. ਇਕਾਂਗੀ ਵਿੱਚ ਮਹਿੱਤਿ ਪਰਨ ਤਿੱਤਾਂਬਾਰੇ ਵਗਆਨ ਹਾਵ ਸਲ ਕਰਨਗੇ

Course Content

ਭਾਗ- I

ਇਕਾਂਗੀ ਯਾਤਰਾ, (ਸੁੰਪਾਕਿ) ਡਾ. ਸਤੀਸ਼ ਕੁਮਾਰਿਰਮਾ ਅਤੇ ਡਾ. ਰਘੁਵਿੰਦਰ ਸੁੰਘ

ਭਾਗ-II

ਇਕਾਂਗੀ ਬਾਰੇ ਮੁੱਢਲੀ ਜਾਣ-ਪਵਰਚਾਣ

ਸੁੰਖੇਪ ਵਨ ਬੁੰਧ ਰਚਨਾ। (250-300 ਸ਼ਬਦਾਂ ਵਿਚ)

ਭਾਗ-III

ਵਨਿੱਜੀ ਵਚਿੱਠੀ ਪਿੱਤਰ।

ਇਸ਼ਵਤ ਹਾਰ ਲੇਖਣ ਅਤੇ ਸਿੱਧਾਂਤ ਪਿੱਤਰ ਲੇਖਣ

ਭਾਗ- IV

ਭਾਸ਼ਾ ਵਿੱਚ ਪਵਰਭਾਸ਼ਾ ਅਤੇ ਵਿਸ਼ੇਸ਼ਤਾ ਵਿੱਚ, ਮਾਤਭਾਸ਼ਾ ਵਿੱਚ ਪਵਰਭਾਸ਼ਾ ਅਤੇ ਮਹਿੱਤਿ ਪੂੰਜਾਬੀ ਆਉ ਪਭਾਸ਼ਾ ਵਿੱਚ
(ਮਾਝੀ, ਮਲਿਈ, ਿਆਬੀ ਅਤੇ ਪੁਆਧੀ)

Transactional Mode

ਲੈਕਚਰ, ਸਮਿੱਵਸ ਆਹਿੱਲ, ਵਮਸ਼ਰਤ ਵਸਖਲਾਈ, ਸਮਹਚਰਚਾ, ਪਰਿਰਸ਼ਨ, ਪੀ.ਪੀ.ਟੀ, ਸੁੰਘ ਵਿਧੀ ਅਤੇ ਕਾਰਜਸੌਪਣੀ।

ਪੁਸਤਕਸੂਚੀ-

- ਡਾ. ਸਤੀਸ਼ ਕੁਮਾਰਿਰਮਾ ਅਤੇ ਡਾ. ਰਘੁਵਿੰਦਰ ਸੁੰਘ (ਸੁੰਪਾਕਿ) 2013, ਇਕਾਂਗੀ ਯਾਤਰਾ, ਪਬਲੀਕੇਸ਼ਨ

ਵਬਊਰੋ, ਪੁੰਜਾਬੀਯਨੀਰਿਵਸਟੀ, ਪਵਟਆਲਾ।

- ਜੇਵਗੁੰਰਿਵਸੁੰਘਪੁਆਰ, ਬਲਿੰਵਸੁੰਘਚੀਮਾ, ਸੁਖਵਿੰਰਿਵਸੁੰਘਸੁੰਘਾਅਤੇੰੇਅਗਨੀਹੇਤਰੀ(1992)

ਪੁੰਜਾਬੀਭਾਸ਼ਾਿੰਾਵਿਆਕਰਨ (ਭਾਗ-ਪਵਹਲਾ) , ਪੁੰਜਾਬੀਭਾਸ਼ਾਅਕਾਿੰਮੀ, ਜਲੁੰਧਰ।

- ਪਰੇਮਪਰਕਾਸ਼ (2011), ਪੁੰਜਾਬੀਭਾਸ਼ਾਿੰਾਜਨਮਅਤੇਵਿਕਾਸ, ਮੈਿੰਾਨਪਬਲੀਕੇਸ਼ਨ, ਪੁੰਜਾਬੀਯਨੀਰਿਵਸਟੀ, ਪਵਟਆਲਾ।

- ਿੰਵਰਆਮਵਸੁੰਘਸੁੰਘਅਤੇਡਾ. ਬਲਿੰਵਸੁੰਘਚੀਮਾ (ਸੁੰਪਾਿੰਕ) 2005ਕਥਾਰੁੰਗ, ਪਬਲੀਕੇਸ਼ਨਵਬਊਰੋ, ਪੁੰਜਾਬੀਯਨੀਰਿਵਸਟੀ, ਪਵਟਆਲਾ।

- ਬਟਾਵਸੁੰਘਬਰਾੜ (2004) ,ਿੰਾਵਰਸਸ਼ਾਹ, ਫਾਉਡੇਸ਼ਨਸ਼ੁੰਵਮਰਤਸਰ।

Course Title: Hindi
Course Code: BAD1118

L	T	P	Credits
4	0	0	4

सम्पूर्ण पाठ्यक्रम के रुचिपूर्ण अध्ययन उपरान्त छात्र समझने के योग्य हो जायेंगे :-

1. वर्णार्थ हिंदी भाषा के आधुनिक काव्य के बारे में जान सकेंगे
2. वर्णार्थ हिंदी व्याकरण व्याकरण के प्रयोग कर सकेंगे
3. वर्णार्थ हिंदी भाषा के गद्य साहित्य में रुचिलेंगे
4. वर्णार्थ हिंदी भाषा का रिनात्मक कायों में प्रयोग कर सकेंगे

विषय.िस्तु

इकाई (क)

- दीवपका : (काव्यसंग्रह) सिंर्हेमराजननमणम,
- भारतेन्दुहररश्त्रि : यमुनाशोभा, भारत, वर्योचगनीनारी
- मैचर्थलीशरगुप्त : साकेत, दोनों और प्रेमपलता है, यशोधरा
- जयशंकरप्रसाद : आंसूसे, प्रेमपचर्थकसे, आशा

इकाई (ख)

- शब्द का अर्थ और प्रकार
- शब्दशक्तियाँ - अभिधा, लक्ष्ा, विंजना
- प्रतीकवर्धन

इकाई (ग)

- आपका बिंटी (उपन्यास) : मन्मथभण्डारी
- पहितगद्यांश

इकाई (घ)

- कवर्तकीपरभाषा और तत्र; कवर्तकाउद् औरवर्कस।
- भाषातलब, वर्धालयपत्रत्रका, र्ाद-वर्ाद, नाट्यकर, तर्ीज़प्रोग्राम)

प्रायोगककायय

ननम्रभलखितमेंसे अपनी पसंद के ककसी एक वर्ष परमौ भलकरिना तैयार करें (र्ाद-

वर्राद, नाट्यकरर, तर्रीज़प्रोग्राम)

पुस्तकसूची

- आपकाबिंटी (उपन्यास); 1970 : मन्नूभण्डारी, जीर्णपयंतभशक्षर्सिस्थान
- दीवपका : (काव्यसिंग्रह) सिंर्हेमराजननमणम, पिंजाबीवश्वर्द्यालयप्रकाशन, पहटयाला।
- ितुर्ेदी, राजेश्ररप्रसार; 2008हहन्दीव्याकरर, उपकारप्रकाशन, आगरा।
- जैनननमणला, 2006; नईसमीक्षाकेप्रनतमान, नैश्रलहाउस, हदल्ली।
- भारुककृष् (डॉ.) हहन्दीभाषाकाइनतहास, अशोकप्रकाशन, हदल्ली, 1997
- बाहरीहरदेर् (डॉ.) 2004, हहन्दी: उद्दर्वर्कासऔररूप, ककताबमहल, हदल्ली।
- बाहरीहरदेर् (डॉ.) 1965, हहन्दीउद्दर्वर्कासऔररूप, ककताबमहल, इलाहाबाद, प्रर्थमसिंस्करर।
- शास्त्रीरामित्रर्माण (डॉ.) एर्िंमायाअग्रर्ाल (डॉ.), भाषा-वर्ज्ञानएर्िंहहन्दीभाषा, अननताप्रकाशन, हदल्ली, 1994

Course Title: Art Education (Performing and Visual)
Course Code: BAD1119

L	T	P	Credits
2	0	0	2

Learning Outcomes: After completion of this course, the learner will be able;

1. To understand the principles and significance of art education.
2. Explore and appreciate various visual and performing art forms.
3. Integrate arts into mainstream education for holistic learning.
4. Develop innovative teaching strategies using arts in education.

Course content

Unit 1: Foundations of Art Education: Concept, Scope, and Importance of Art Education, Historical Development of Art in India, Aesthetic Theories and Philosophies of Art, Role of Art in Child Development and Education

Unit 2: Visual Arts: Types of Visual Arts: Drawing, Painting, Sculpture, Folk Art, Exploring Indian Traditional and Folk Art Forms, Digital Art and Its Role in Education, Art Appreciation and Criticism

Unit 3: Performing Arts: Introduction to Performing Arts: Music, Dance, Drama, and Theatre, Classical and Folk Performing Arts of India, Role of Theatre in Education, Methods and Strategies for Teaching Performing Arts

Unit 4: Art Integration in Education: Concept of Art Integration in Teaching and Learning, Developing Creativity and Critical Thinking through Arts

Transaction Mode

- Demonstration: Hands-on learning of different art forms.
- Workshops: Interactive sessions with artists and experts.
- Performance-based Learning: Engaging students in drama, music, and dance activities.
- Project Work: Creating artistic projects based on traditional and modern themes.

Suggested Readings

- *National Education Policy 2020. Ministry of Education, Government of India.*
- *NCERT (2006). Position Paper on Arts, Music, Dance, and Theatre.*
- *National Education Policy 2020. Ministry of Education, Government of India.*
- *NCERT (2006). Position Paper on Arts, Music, Dance, and Theatre.*

- Ananda Coomaraswamy (2016). *The Transformation of Nature in Art*.
- Kapila Vatsyayan (1997). *The Square and the Circle of Indian Arts*.
- Efland, A. (2002). *Art and Cognition: Integrating the Visual Arts in the Curriculum*.

Course Title: Understanding India (Indian Ethos and Knowledge Systems)

Course Code: BAD1120

L	T	P	Credits
2	0	0	2

Learning outcomes

After completion of this course, the learner will be able to

1. To familiarize learners with the vast corpus of Indian knowledge traditions and foster an appreciation of their significance.
2. To develop learners' understanding of diverse Indian traditions and their contributions to various fields of knowledge.
3. To enable learners to apply research and critical thinking skills in exploring multidisciplinary themes related to Indian knowledge traditions.
4. To equip learners with the ability to summarize and effectively communicate their understanding of Indian traditions to students in an accessible and engaging manner.

Course Content

Unit 1 Introduction to the Knowledge of India: Definition & scope; Relevance of this knowledge Need to revisit our ancient knowledge, traditions, and culture

UNIT – II Culture – Art and Literature: Fine arts (traditional art forms, contemporary arts, arts & spirituality, arts and Identity, and art and globalization); B. Performing Arts (Indian dance systems, traditional Indian pieces of music, visual arts, folk arts, etc.), Literature (Sanskrit literature, religious literature, Indian poetry, folk literature, Indian fiction, Sangam literature, Kannada, Malayalam literature, Bengali literature, etc.

UNIT – III Polity and Law: Kingship & types of government (oligarchies, republics); Local administration (village administration);

B. Basis of Law: Dharma & its sources; Criminal Justice: police, jails, and punishments; Lessons from Chanakyaniti; Lessons for modern-day India: Towards a tradition-driven equitable and just polity and law system.

UNIT – IV Economy: A. Overview of the Indian Economy from the Stone Age to the Guptas: The new culture of Urbanization (including castes, guilds, and other economic institutions; Harappan civilization economy; growth of agriculture and proliferation of new occupations; growth of writing); Internal & external trade and commerce, including trade routes, Indo-roman contacts, and maritime trade of South India; Temple economy. Land ownership – land grants & property rights, land revenue systems. Understanding Arthashastra: Ideas & Criticism; Locating relevance of ancient Indian economic thought in modern-day Indian Economy.

Transactional Mode

Lectures will include learner-driven participatory sessions, and Guest lectures through experts and practitioners, such as fine arts and performing arts practitioners along with contemporary poets & writers of Indian literature. Tutorials will include Screening of documentaries and films followed by a discussion; Learner-driven discussions in the form of focus group discussions (FGDs), Socratic Discussions, etc.; Debate/discussion can be organized to explain India's Vaad tradition

Suggested Readings

- *Balagangadhara, S. N. The Heathen in His Blindness: Asia, the West, and the Dynamic of Religion. Brill, 1994.*
- *Kapila Vatsyayan. Traditions of Indian Folk Dance. Clarion Books, 1987.*
- *L. Basham. The Wonder That Was India. Rupa & Co., 1954.*
- *P. V. Kane. History of Dharmashastra (Vol. 1-5). Bhandarkar Oriental Research Institute.*
- *Bibek Debroy. The Mahabharata (translated volumes). Penguin Classics.*
- *. Radhakrishnan, S. Indian Philosophy (Vol. 1 & 2). Oxford University Press.*
- *Ananda K. Coomaraswamy. The Dance of Śiva: Essays on Indian Art and Culture. Munshiram Manoharlal Publishers, 1999.*
- *K. Ramanujan. The Interior Landscape: Love Poems from a Classical Tamil Anthology. Oxford India Paperbacks, 1994.*
- *K. Ayyappa Paniker. Medieval Indian Literature: An Anthology. Sahitya Akademi, 1997.*
- *R. C. Majumdar. The History and Culture of the Indian People (Volumes 1-11). Bharatiya Vidya Bhavan*

SEMESTER-II
PHYSICS -MAJOR

Course Title: Electricity and Magnetism
Course Code: BSD2150

L	T	P	Credits
4	0	0	4

Total Hours: 45

Course Learning Outcomes: After completion of this course, the learner will be able to:

- 1: To develop the skills on the electrostatics techniques for calculating potential
- 2: To enrich their theoretical knowledge on the electric field in the matter
- 3 : To comprehend the knowledge on the magnetostatics
- 4 : To develop the understanding on the magnetostatics field in matter

Course Content

Unit I

13 Hours

1. Electrostatics Electrostatic field – Coulomb’s law, Electric field, Continuous charge distributions -Divergence and curl of electrostatic field, Field lines and Gauss law, The divergence of E, Applications of Gauss law, Curl of E - Electric potential – Comments on potential, Poisson’s equation and Laplace's equation, The potential of a localized charge distribution, Electrostatic boundary conditions – Work and energy in electrostatics, The work done in moving a charge, The energy of point charge distribution, The Energy of a continuous charge distribution, Comments on Electrostatic energy – Conductors, Basic properties of conductors, Induced charges, The Surface charge on a conductor, The force on surface charge, Capacitors. (Sections 2.1 to 2.5 of Introduction to Electrodynamics by David J Griffiths)

2. Special Techniques for Calculating Potentials Laplace’s equation in One Dimension, Two Dimensions and Three Dimensions, Uniqueness theorems - Method of images, The classic image problem, induced surface charge, force and energy. (Sections 3.1 to 3.2.3 of Introduction to Electrodynamics by David J Griffiths)

Unit II

12 Hours

3. Electric fields in matter Polarization – Dielectrics, Induced dipoles, Alignment of polar molecules, Polarization – The field of a polarized object , Bound charges, Physical interpretation of bound charges, The field inside a dielectric – The electric displacement – Gauss’s law in presence of 13 dielectrics, Boundary conditions for D – Linear dielectrics, Susceptibility,

Permittivity, Dielectric constant, Energy in dielectric systems, Forces on dielectrics, Polarizability and susceptibility. (Sections 4.1 to 4.4.1, 4.4.3, 4.4.4 of Introduction to Electrodynamics by David J Griffiths)

Unit III

10 Hours

4. Magnetostatics The Lorentz force law – Magnetic fields, Magnetic forces, cyclotron motion, cycloid motion, Currents, Linear, Surface and Volume current density – Biot - Savart law, The magnetic field of steady current – Divergence and curl of $\mathbf{B}$, Straight line currents, Applications of Ampere's law, Magnetic field of a toroidal coil, Comparison of magnetostatics and electrostatics – Magnetic vector potential, Vector potential, Magnetostatic boundary conditions. (Sections 5.1 to 5.4.2 of Introduction to Electrodynamics by David J Griffiths)

Unit IV

10Hours

5. Magnetostatic fields in matter Magnetisation – Diamagnets, Paramagnets and Ferromagnets, Torques and forces on magnetic dipoles, Effect of a magnetic field on atomic orbits, Magnetization – Field of a magnetised object, Bound Currents, Physical interpretation, Magnetic field inside matter – Auxiliary field $\mathbf{H}$, Ampere's law in magnetised materials, Boundary conditions – Linear and nonlinear media, Magnetic susceptibility and permeability, Ferromagnetism. (Sections 6.1 to 6.4 of Introduction to Electrodynamics by David J Griffiths)

Suggestive Mode of Transaction:

The course content transaction will include the following; Planned lectures infused with multimedia/PowerPoint presentations. Small group discussion, panel interactions, small theme-based seminars, cooperative teaching, and team teaching, flipped learning, blended learning, demonstration, laboratory method

Textbook for study: Introduction to Electrodynamics by David J Griffiths, 3rd Ed.

Books for reference: 1. Electricity and magnetism by Arthur F Kip 2. Physics Vol. II by Resnick and Halliday

PHYSICS (MAJOR)

Course Title: Properties of Matter, Waves & Acoustics

Course Code: BSD2151

L	T	P	Credits
4	0	0	4

Total Hours: 45

Course Learning Outcomes: After completion of this course, the learner will be able to:

1. Explain the fundamental concepts of elasticity, including elastic constants, Poisson's ratio, torsion, and bending of beams, and apply them to determine material properties.
2. Analyze simple harmonic motion, damped and forced oscillations, and evaluate the energy and characteristics of harmonic oscillators.
3. Describe the principles of wave motion, including progressive waves, wave energy, transverse and longitudinal vibrations, Fourier analysis, and wave propagation.
4. Apply the concepts of acoustics and ultrasonics to understand sound intensity, noise pollution, reverberation, acoustic design of buildings, and the practical applications of ultrasonic waves.

Course Content

Unit I

13 Hours

Properties of Matter Elasticity: Basic ideas, Work Done per Unit Volume, Relations between elastic constants, Poisson's Ratio, Limiting Values of Poisson's Ratio, Twisting Couple on a Cylinder (or a Wire), Torsion pendulum, Determination of Rigidity Modulus, Bending of Beams, Bending Moment, Cantilever Loaded at Free End, Depression of a Beam Supported at the Ends and Loaded at the Centre (weight of the beam neglected), Determination of Y by Bending of a Beam, I form of Girders. (Sections: 8.1 to 8.18, 8.22 to 8.23, 8.26 to 8.27, 8.29 to 8.30, 8.33 to 8.34 Elements of Properties of Matter by D.S. Mathur)

Unit II

12 Hours

Harmonic Oscillator Periodic Motion, Simple Harmonic Motion and Harmonic Oscillator, Energy of a Harmonic Oscillator, Examples of Harmonic Oscillator, Anharmonic Oscillator, Composition of Two Simple Harmonic Motions of Equal Periods in a Straight Line, Composition of Two Rectangular Simple Harmonic Motions of Equal Periods: Lissajous Figures, Damping Force, Damped Harmonic Oscillator, Examples of Damped Harmonic Oscillator, Power Dissipation, Quality Factor, Forced Harmonic Oscillator (Sections: 9.1 to 9.4, 9.7, 9.10 to 9.11, 10.1 to 10.4 to 10.6 of Mechanics by J.C Upadhyaya)

Unit III

10 Hours

Waves Wave Motion, General Equation of Wave Motion, Plane Progressive Harmonic

Wave, Energy Density for a Plane Progressive Wave, Intensity of a Wave, Transverse Waves in Stretched Strings, Modes of Transverse Vibrations of Strings, Longitudinal Waves in Rods and Gases, Fourier's Theorem, Wave Velocity and Group Velocity (Sections: 11.1 to 11.9, 11.12 to 11.13 of Mechanics by J.C Upadhyaya)

Unit IV

12Hours

Acoustics Intensity of Sound- Decibel and Bel, Loudness of Sound, Noise Pollution, Ultrasonics: Production of Ultrasonic Waves- Piezo Electric Crystal Method, Determination of Velocity of Ultrasonic Waves in a Liquid - Acoustic Grating, Application of Ultrasonic Waves, Reverberation, Sabine's Formula (Derivation not required), Absorption Coefficient, Acoustics of Buildings (Sections: 4.10 to 4.13, 5.1 to 5.3, 5.7 to 5.10, 5.12 to 5.15 of Properties of Matter and Acoustics by R.Murugesan & Kiruthiga Sivaprasath)

Suggestive Mode of Transaction

The course content transaction will include the following; Planned lectures infused with multimedia/PowerPoint presentations. Small group discussion, panel interactions, small theme-based seminars, cooperative teaching, and team teaching, flipped learning, blended learning, demonstration, laboratory method

Books for Study

1. Elements of Properties of Matter by D.S. Mathur 2008
2. Mechanics by J.C Upadhyaya 2003
3. Properties of Matter and Acoustics by R.Murugesan & Kiruthiga Sivaprasath 2005

Reference

1. Mechanics -- D.S. Mathur
2. Text book of Sound –Brij Lal& Subramaniam
3. Text book of Sound –Khanna .D.R. & Bedi.R.S.
4. Berkeley Physics course Vol 3 on Waves

Physics Practical-I

Course Title: Experimental Physics: Magnetism and Oscillations

Course Code: BSD2152

L	T	P	Credits
0	0	4	2

Total Hours: 45

Course Learning Outcomes: After completion of this course, the learner will be able to:

1. Determine magnetic moments and related magnetic parameters using deflection and vibration magnetometers.
2. Apply the principles of magnetism and oscillations to analyze experimental arrangements such as Tan A, Tan B, Tan C, and vibration methods.
3. Measure frequency and relative density of solids using Melde's string arrangement in different modes of vibration.
4. Evaluate the figure of merit of a mirror galvanometer and develop skills in precise experimental observation, data analysis, and error estimation.

Course Content

1. Deflection magnetometer-TAN A, Tan B positions
2. Deflection magnetometer -Tan C Position-moment of moments
3. Searle's vibration magnetometer-moment & ratio of moments
4. Box type vibration magnetometer-m & Bh
5. Melde's string arrangement-Frequency, relative density of solid (both modes)
6. Mirror galvanometer-figure of merit

Physical Practical-II

Course Title: Experimental Physics: Electricity and Optics

Course Code: BSD2153

L	T	P	Credits
0	0	4	2

Total Hours: 15

Course Learning Outcomes: After completion of this course, the learner will be able to:

1. Perform electrical measurements using potentiometers and galvanometers for determining resistance, current, and capacitance.
2. Apply the principles of electrical circuits to verify fundamental laws and theorems such as Kirchhoff's laws and Thevenin's theorem.
3. Analyze optical phenomena using a spectrometer and interpret the relationship between angle of incidence and angle of deviation.
4. Develop competence in experimental techniques, precision measurements, data analysis, and interpretation of results in electricity and optics experiments.

Course Content

1. 7. Potentiometer-measurement of resistance
2. 8. Potentiometer-calibration of ammeter
3. 9. Ballistic Galvanometer- BG constant using HMS-then find Bh.
4. 10. B.G.-Comparison of capacities Desauty's method.
5. 11. Spectrometer- i-d curve
6. 12. Verification of Kirchoff's laws, Verification of Thevenin's theorem

CHEMISTRY (MAJOR)

Course Title: Inorganic Chemistry-II Chemistry of S, P, D & F Block Elements

Course Code: BSD2154

L	T	P	Credits
4	0	0	4

Total Hours: 45

Course Learning Outcomes: After completion of this course, the learner will be able to:

1. Explain the organization of the periodic table and the periodic trends in the physical and chemical properties of s-, p-, d-, and f-block elements.
2. Analyze the electronic configuration, bonding, oxidation states, and characteristic properties of s- and p-block elements and their compounds.
3. Describe the preparation, structure, properties, and reactions of important compounds of alkali metals, alkaline earth metals, and Groups III, IV, and V elements.
4. Interpret the structures, bonding, and chemical behavior of compounds of Groups VI, VII, and noble gases, including interhalogens, polyhalides, and noble gas compounds.

Course Content

Unit I

11 Hours

a.Periodicity of Elements: Introduction of s, p, d, f block elements, the long form of periodic table. Detailed discussion of periodic properties of the elements b.Comparative Study of s and p Block Elements: IA-VII A and Zero Groups: General remarks about each group, trends in electronic configuration, structure of elements, atomic and ionic, Radii, ionization potential, electron affinity, electronegativity, oxidation states, inert pair effect, catenation and heterocatenation, first and second row anomalies, the use of d orbitals by non- metals, the use of p orbitals in bonding. Important classes of Compounds of s and p block.

Unit II

11 Hours

a. Alkali Metals: Oxides, hydroxides, peroxides and super oxides, halides, hydrides, solutions of metals in liquid ammonia, complexes crowns and cryptands and podands.
b.Alkaline Earth Metals: Solutions of the metals in liquid ammonia, hydroxides, oxides, sulfates, hydrides, halides, carbides, structures of calcium carbide, structures of basic beryllium acetate $\text{Be}_4\text{O}(\text{CH}_3\text{COO})_6$, beryllium oxalate complexes $\text{Be}(\text{OX})_2$. Structure of chlorophyll 'a'.

Unit III

11 Hours

a. Group III (Boron Group): Oxides, halides and hydrides of group III elements, boron sesquioxide and borates structure of borates, trihalides and lower halides of boron, preparation of boron hydrides reactions and structures of boranes.

b. Group IV (Carbon Group): Structure and allotropy of the elements, types and structure of carbides, oxides of carbon and silicon, types and structures of silicates, Organo-silicon compounds and the silicones, halides of IV group elements. Group V (Nitrogen Group): Hydrides, properties and structure of ammonia, hydrazine, hydroxylamine, trihalides and Pentahalides of V groups elements, oxides of nitrogen, structure of N_2O , NO , N_2O_3 , N_2O_4 and N_2O_5 , oxo acids of nitrogen and phosphorous, phosphazenes and cyclophosphazenes.

Unit IV

12Hours

a. Group VI (Oxygen Group): Structure and allotropy of the elements. Oxides of sulfur (structure of SO_2 and SO_3) oxoacids of sulfur halides of sulfur, selenium and tellurium, compounds of Sulfur and nitrogen (S_4N_4).

b. Group VII: Oxides of halogens (OF_2 , O_2F_2 , Cl_2O , ClO_2 , Cl_2O_6 , BrO_2 , I_2O_5) (structures), Preparation, reaction and structure interhalogen compounds. (ClF_3 , BrF_3 , I_2 , Cl_5 , IF_5 , IF_7) Polyhalides, basic properties of halogens. Zero Group: Clathrate compounds, preparation, structure and bonding of noble gas compounds (XeF_2 , XeF_4 , XeF_6 , XeO_3 , XeO_2F_2 , XeO_4).

Suggestive Mode of Transaction

The course content transaction will include the following; CLO2 CLO3 Planned lectures infused with multimedia/PowerPoint presentations. Small group discussion, panel interactions, small theme-based seminars, cooperative teaching, and team teaching, flipped learning, blended learning, demonstration, laboratory method

Suggested Readings:

- J.D. Lee, Concise Inorganic Chemistry, 4th Ed.
- J.E. Huheey, Inorganic Chemistry, Harper & Row.
- F.A. Cotton and G. Wilkinon, Advanced Inorganic Chemistry, Interscience Publishers.
- N.N. Greenwood and A. Earnshaw, Chemistry of Elements, Pergamon Press.
- Cotton, F.A., Wilkinson, G., Gaus, P.L., Basic Inorganic Chemistry; 2nd edition, Pubs: John Wiley and Sons, 1995.
- Lee, J.D., Concise Inorganic Chemistry; 4th edition, Pubs: Chapman & Hall Ltd., 1991.
- Shriver, D.E., Atkins, P.W., Inorganic Chemistry; 4th edition, Pubs: Oxford University Press, 2006.
- Douglas, B., Medaniel, D., Atenander, J., Concepts and Models of Inorganic Chemistry, 3rd edition, Pubs: John Wiley and Sons Inc., 1994,
- Porterfeild, W.W., Wesky, A., Inorganic Chemistry; Pubs: Addison-Wesky Publishing Company, 1984.
- Miessler, G.L., Tarr, D.A., Inorganic Chemistry; 3rd edition, Pubs: Pearson

- Education Inc. 2004,
- Jolly, W.L., Modern Inorganic Chemistry; 2nd edition, Pubs: Tata McGraw-Hill Publishing Company Limited, 1991.
 - Purcell, K.F., Kotz, J.C., Inorganic Chemistry; Pubs: W.B.Saunders Company, 1977.
 - Puri, B.R., Sharma, L.R., Kalia, K.K., Principles of Inorganic Chemistry; 30th edition, Pubs: Milestones Publisher, 2006-07.
 - Inorganic Chemistry, W.W. Porterfield Addison-Wesley. • Inorganic Chemistry, A.G. Sharpe, ELBS.

CHEMISTRY (MAJOR)

Course Title: Physical Chemistry-I (States of Matter and Ionic Equilibria)

Course Code: BSD2155

L	T	P	Credits
4	0	0	4

Total Hours: 45

Course Learning Outcomes: After completion of this course, the learner will be able to:

1. Explain the fundamental concepts of gaseous, liquid, and solid states of matter, including their properties and behavior under different conditions.
2. Analyze the kinetic theory of gases, critical phenomena, molecular velocity distributions, and the physical properties of liquids and solids.
3. Describe crystal structures, X-ray diffraction techniques, crystal defects, colloidal systems, and their significance in understanding the solid state.
4. Apply the principles of ionic equilibria, buffer solutions, salt hydrolysis, solubility product, and acid–base titrations to solve chemical problems and interpret chemical processes.

Course Content

Unit I

11 Hours

- a. Gaseous States: Postulates of kinetic theory of gases, deviation from ideal behavior, van der Waals equation of State.
- b. 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.
- c. 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 (based on Joule Thomson effect).

Unit II

11 Hours

- a. Liquid State: Qualitative treatment of the structure of the liquid state; physical properties of

liquids; vapour pressure, surface tension and coefficient of viscosity. Effect of various solutes, on surface tension and viscosity. Variation of viscosity of liquids with temperature and comparison with that of gases.

b.Solid State-I: Nature of the solid state, law of constancy of interfacial angles, law of rational indices, Miller indices, elementary ideas of symmetry, symmetry elements and symmetry operations, qualitative idea of point and space groups, seven crystal systems and fourteen Bravais lattices.

Unit III

11 Hours

a. Solid State-II: X-ray diffraction, Bragg's law, a simple account of rotating crystal method and powder pattern method. Analysis of powder diffraction patterns of NaCl, CsCl and KCl. Defects in crystals. Glasses and liquid crystals (Laue's method and powder method). classification of colloids.

b.Ionic equilibria-I: Strong, moderate and weak electrolytes, degree of ionization, factors affecting degree of ionization, ionization constant and ionic product of water. Ionization of weak acids and bases, pH scale, common ion effect; dissociation constants of mono , di-and triprotic acids (exact treatment).

Unit IV

12Hours

a. Ionic Equilibria-II: Salt hydrolysis-calculation of hydrolysis constant, degree of hydrolysis and pH for different salts. Buffer solutions; derivation of Henderson equation and its applications; buffer capacity, buffer range, buffer action and applications of buffers in analytical chemistry and biochemical processes in the human body.

b.Solubility and solubility product of sparingly soluble salts – applications of solubility product principle. Qualitative treatment of acid – base titration curves (calculation of pH at various stages). Theory of acid–base indicators; selection of indicators and their limitations.

Suggestive Mode of Transaction

The course content transaction will include the following;

Planned lectures infused with multimedia/PowerPoint presentations. Small group discussion, panel interactions, small theme-based seminars, cooperative teaching, and team teaching, flipped learning, blended learning, demonstration, laboratory method

Suggested Readings

- Principles of physical chemistry Author: S. H. Maron & C. F. Prutton. Publisher: Collier

- Macmillan Ltd; 4th Revised edition edition (1 December 1965) ISBN-10: 0023762306
- Physical Chemistry Author: K. J. Laidler. Publisher: Houghton Mifflin; 4th Revised ed. edition (May 1, 2002) ISBN-10: 061815292X
 - Physical Chemistry Vol-1 Author: K. L. Kapoor. Publisher: Laxmi Publications; Fourth edition (2011) ISBN 10: 0230332757
 - Physical chemistry Author: W. J. Moore. Publisher: Longman; 1st Revised edition edition (24 July 1972) ISBN 10: 0582442346
 - Atkins, P., Paula, J.de, Atkins Physical Chemistry; 8th edition, Pubs: Oxford University Press, 2008.
 - Puri, B.R., Sharma, L.R., Pathania, M.S., Principles of Physical Chemistry; 43rd edition, Pubs: Vishal Publishing Co., 2008.
 - Barrow, G.M., Physical Chemistry; 6th edition, Pubs: McGraw Hill Inc, 1996.
 - Rao, C.N.R., University General Chemistry; Pubs: Macmillan India, 1985
 - Berry, R.S., Rice, S.A., Ross, J., Physical Chemistry; 2nd edition, Pubs: Oxford University Press, 2000.
 - Albert, R.A., Silbey, R.J., Physical Chemistry; 1st edition, Pubs: John Wiley & Sons Inc., 1992.
 - Dogra, S.K., Dogra, S., Physical Chemistry Through Problems; Pubs: Wiley Eastern Limited, 1991.
 - Levine, I.N., Physical Chemistry; 5th edition, Pubs: Tata McGraw Hill Publishing Co. Ltd., 2002.
 - Moore, W. J., Basic Physical Chemistry; Pubs: Prentice Hall of India Pvt. Ltd, 1983.
 - University General Chemistry, C.N.R. Rao, Macmillan.

Chemistry (Major)

Course Title: Inorganic Chemistry-II (Practical-I: Qualitative Analysis)

Course Code: BSD2156

L	T	P	Credits
0	0	4	2

Total Hours: 45

Course Learning Outcomes: After completion of this course, the learner will be able to:

1. Demonstrate a sound understanding of qualitative inorganic analysis and the chemical principles underlying the identification of ions.
2. Perform systematic separation and identification of anions and cations in mixtures using standard laboratory procedures and special tests.
3. Apply appropriate analytical techniques, group analysis, and spot tests for the detection of common and less familiar ions.
4. Develop scientific inquiry, laboratory skills, accuracy in experimentation, and confidence in interpreting qualitative analytical results.

Course Content

- Supplement and reinforce chemical principles taught in the theory units.
- Special Tests for Mixture of Anions (do any 8)
- Carbonate in the presence of sulphate.
- Nitrate in the presence of nitrite
- Nitrate in the presence of bromide and iodide.
- Nitrate in the presence of chlorate.
- Chloride in the presence of bromide and iodide.
- Chloride in the presence of bromide.
- Chloride in the presence of iodide.
- Bromide and iodide in the presence of each other and of chloride.
- Iodate and iodide in the presence of each other.
- Phosphate, arsenate and arsenite in the presence of each other.
- Sulphide, sulphite, thiosulphate and sulphate in the presence of each other.
- Borate in the presence of copper and barium salts.
- Oxalate in the presence of fluoride.
- Oxalate, tartrate, acetate, citrate in the presence of each other.
- Separation and Identification of Cations in Mixtures
- Separation of cations in groups.
- Separation and identification of Group I, Group II (Group IIA and IIB), Group III, Group IV, Group V and Group VI cations.
- Identification of Cations including Less Familiar Elements by Spot Tests Assisted by Group Analysis (3 cations).

Suggested Readings:

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

Course Title: Physical Chemistry-I (Practical-II)

Course Code: BSD2157

L	T	P	Credits
0	0	4	2

Total Hours: 45

Course Learning Outcomes: After completion of this course, the learner will be able to:

1. Prepare and standardize chemical solutions and demonstrate safe and accurate laboratory practices.
2. Determine and analyze the surface tension and viscosity of liquids using different experimental methods and study the effects of concentration and temperature on these properties.
3. Interpret powder diffraction patterns and apply basic principles of crystallography for the identification of cubic crystalline systems.
4. Perform pH measurements, prepare buffer solutions, conduct pH-metric titrations, and determine the dissociation constant of weak acids using experimental data.

Course Content

- Preparation of solutions:
- Basic concepts and standardization
- Surface tension measurements.
- Determine the surface tension by
- Drop number (ii) drop weight method (iii) capillary rise method.
- Study the variation of surface tension of detergent solutions with concentration and hence the CMC value.
- Viscosity measurement using Ostwald's viscometer.
- Determination of viscosity of aqueous solutions of Polymer (ii) ethanol and (iii) sugar at room temperature.

- Study the variation of viscosity of sucrose solution with the concentration of solute.
- Study effect of temperature on viscosity of water.
- Indexing of a given powder diffraction pattern of a cubic crystalline system.
- pHmetry
- Study the effect on pH of addition of HCl/NaOH to solutions of acetic acid, sodium acetate and their mixtures.
- Preparation of buffer solutions of different pH
- Sodium acetate-acetic acid
- Ammonium chloride-ammonium hydroxide
- pH metric titration of (i) strong acid vs. strong base, (ii) weak acid vs. strong base.
- Determination of dissociation constant of a weak acid.

Suggested Readings:

- Khosla, B. D.; Garg, V. C. & Gulati, A. Senior Practical Physical Chemistry, R. Chand & Co.: New Delhi (2011).
- Garland, C. W.; Nibler, J. W. & Shoemaker, D. P. Experiments in Physical Chemistry 8th Ed.; McGraw Hill: New York (2003).
- Halpern, A. M. & McBane, G. C. Experimental Physical Chemistry 3rd Ed.; W.H. Freeman & Co.: New York (2003).
- Advanced Practical Physical Chemistry, J.B. Yadav, Goel Publishing House.
- Advanced Experimental Chemistry, Vol. I, Physical, J.N. Guru and R. Kapoor, S. Chand & Co.
- Selected Experiments in Physical Chemistry, N.G. Mukherjee, J.N. Ghosh & Sons.
- Experiments Physical Chemistry, J.C. Ghosh, Bharati Bhavan.

MATHEMATICS (MAJOR)

Course Title: Differential Equations

Course Code: BSD2158

L	T	P	Credits
4	0	0	4

Total Hours: 45

Course Learning Outcomes: After completion of this course, the learner will be able to:

1. To understand Order and degree of differential equation, Linear and non-linear differential equations.
2. To comprehend Applications of differential equations of first order and first degree.
3. To understand Differential equations of first order and higher degree solvable for x , y and p .
4. To understand linear differential equations with constant coefficients, Methods of variation of Parameters.

Course Content

Unit I

15 Hours

Order and degree of differential equation, Linear and non-linear differential equations, Formation of differential equation, Existence and uniqueness theorem, Differential equations of first order and first degree: separation of variables, homogeneous differential equations, Pfaffian differential equation.

Unit II

15 Hours

Exact differential equations, Linear differential equations, Geometric meaning of a differential equation of first order and first degree, Applications of differential equations of first order and first degree, Orthogonal trajectories.

Unit III

15 Hours

Differential equations of first order and higher degree solvable for x , y and p , Clairaut's forms and singular solutions, Extraneous loci.

Unit IV

15 Hours

Linear differential equations with constant coefficients, Methods of variation of parameters, Homogeneous linear differential equations, Simultaneous differential equations.

Suggestive Mode of Transaction

The course content transaction will include the following; Planned lectures infused with multimedia/PowerPoint presentations. Small group discussion, panel interactions, small theme-

based seminars, cooperative teaching, and team teaching, flipped learning, blended learning, demonstration, laboratory method

Suggested Readings:

- D.A. Murray: Introductory Course in Differential Equations. Orient Longman (India), 1967.
- G.F. Simmons: Differential Equations, Tata McGraw Hill, 1972.
- E.A. Codington: An Introduction to Ordinary Differential Equations, Prentice Hall of India, 1961.
- Tom M. Apostol: Calculus: An Indian Adaptation, Wiley India, 2023
- Erwin Kreyszig: Advanced Engineering Mathematics, John Wiley and Sons, 1999. 52
- Narayan, S. and P.K. Mittal: Integral Calculus. Sultan Chand & Sons.
- Narayan S. and P.K. Mittal: Differential Calculus, Sultan Chand & Sons.

Mathematics(Major)

Course Title: Calculus-II

Course Code: BSD2159

L	T	P	Credits
4	0	0	4

Total Hours:

60

Course Learning Outcomes: After completion of this course, the learner will be able to:

1. To understand Limit and continuity of functions of two variables, partial differentiation, change of variables.
2. Enhance their knowledge related to Integration of trigonometric and hyperbolic functions.
3. To understand Quadrature and Rectification.
4. To comprehend applications to evaluate area, volume surface of solid of revolution

Course Content

Unit I

15 Hours

Limit and continuity of functions of two variables, partial differentiation, change of variables, Differentiability of real-valued functions of two variables, Euler's theorem on homogeneous functions, Taylor's theorem for functions of two variables, Jacobians, Maxima and Minima.

Unit II

15 Hours

Integration of trigonometric and hyperbolic functions, Reduction formula, Definite integrals, Fundamental theorem of integral calculus, Beta and Gamma functions.

Unit III

15 Hours

Quadrature and Rectification, Double and Triple integrals, change of variables, Change of order of Integration.

Unit IV

15Hours

Applications to evaluate area, volume surface of solid of revolution, Centre of Gravity, Moment of Inertia

Suggestive Mode of Transaction

The course content transaction will include the following; Planned lectures infused with multimedia/PowerPoint presentations. Small group discussion, panel interactions, small theme-based seminars, cooperative teaching, and team teaching, flipped learning, blended learning, demonstration, laboratory method

Suggested Readings:

- Narayan, S. and P.K. Mittal: Integral Calculus. Sultan Chand & Sons.
- Narayan S. and P.K. Mittal: Differential Calculus, Sultan Chand & Sons.
- Tom M. Apostol: Calculus: An Indian Adaptation, Wiley India, 2023

Mathematics(Major)

Course Title: Numerical Methods

Course Code: BSD2160

L	T	P	Credits
4	0	0	4

Course Learning Outcomes: At the end of the course, the students will be able to:

1. Understand the different types of numerical errors and apply numerical methods to solve nonlinear algebraic and transcendental equations.
2. Apply direct and iterative techniques to solve systems of linear equations and find eigen values and eigenvectors numerically.
3. Use finite differences and interpolation methods effectively for data approximation and numerical differentiation.
4. Employ numerical integration methods and solve ordinary differential equations using standard numerical techniques.

Course Content

Unit I

15 hours

Errors in numerical computations: sources, types, and error propagation. Numerical solution of algebraic and transcendental equations: Bisection method, Regula-Falsi, Newton-Raphson, Secant, and Iterative methods.

Unit II

15 hours

Solution of systems of linear equations: Gauss elimination, Gauss-Jordan, Crout's method, LU decomposition. Iterative methods: Jacobi, Gauss-Seidel, and Relaxation methods. Eigenvalues and eigenvectors: Power method, Jacobi method.

Unit III

15 hours

Finite differences and finite difference operators. Interpolation: Newton's forward and backward interpolation, divided differences, Lagrange interpolation, inverse interpolation. Numerical differentiation using finite differences.

Unit IV

15 hours

Numerical integration: Trapezoidal rule, Simpson's rules, Newton-Cotes formulas. Numerical solution of ordinary differential equations: Euler's method, Modified Euler's method, Runge-Kutta methods, Predictor-Corrector methods (Milne-Simpson).

Suggestive Mode of Transaction:

The course content transaction will include the following: Planned lectures infused with multimedia/PowerPoint presentations. Small group discussions, panel interactions, small theme-based seminars, cooperative teaching, team teaching, flipped learning, blended learning, demonstrations of algorithms' implementation and use of calculators/software for practical understanding.

Suggestive Mode of Assessment: Assignments, Class tests, Problem-solving, Semester examinations.

Suggestive Readings:

- S.S. Sastry, Introductory Methods of Numerical Analysis (PHI)
- M.K.Jain, S.R.K.Iyengar, R.K.Jain, Numerical methods for Scientific and Engineering Computation (New Age International)
- B.S. Grewa, Numerical Methods: For Engineering and Science (Khana Publishers)

Ability Enhancement & Value- Added Courses

Course Title: Punjabi	L	T	P	Cr.
Course Code: BAD2174	4	0	0	4

Course outcomes

ਇਸਕੋਰਸਨੂੰ ਪਾਸਕਰਨ ਉਪਰੰਤ ਵਿਵਿਧ ਆਰਥੀ ਇਸ਼ੇਗ ਹੋ ਜਾਣਗੇ

1. ਵਿਵਿਧ ਆਰਥੀ ਵਨ ਬੁੰਧਕ ਲਾਬਾਰੇ ਜਾਣਕਾਰੀ ਹਾਵਸ ਲਕਰਨਗੇ
2. ਪੂੰਜਾਬੀ ਭਾਸ਼ਾ ਵਿਆਕਰਨ ਬਾਰੇ ਜਾਣਕਾਰੀ ਪਰਾਪਤ ਕਰਨਗੇ
3. ਫਿਤਰੀ ਪਿੱਤਰ ਵਲ ਖਣਾਵ ਸਿੱਖ ਕੇ ਵਿਹਾਰਕ ਜੀਨ ਵਿੱਚ ਰਤੋਂ ਕਰਨਗੇ
4. ਪੂੰਜਾਬੀ ਭਾਸ਼ਾ ਵਿਆਪਨੀ ਆਬਾਰੇ ਜਾਣਕਾਰੀ ਪਰਾਪਤ ਕਰਨਗੇ

Course Content

ਭਾਗ-ੳ

Total Hours: 15

ਆਧਵਨਕ ਪੂੰਜਾਬੀ ਾਰਤਕਨਾਲ ਮੁੱਢਲੀ ਜਾਣ-ਪਛਾਣ

ਭਾਗ-ਅ

Total Hours: 15

ਿਾਰਤਕ ਵਿੱਕ, (ਸੁੰਪਾਕਿ) ਰਾਵਜ਼ੀਰ ਪਾਲਵਸੁੰਘ ਬਰਾੜ ਅਤੇ ਡਾ. ਜਗਤਾਰਵਸੁੰਘ ਜੋਗਾ

ਭਾਗ-ੲ

Total Hours: 15

ਫਿਤਰੀ ਪਿੱਤਰ, ਨੋਵਟਸ ਲੇਖਣ ਅਤੇ ਸਮਾਚਾਰ ਲੇਖਣ, ਪਰੈਸੀਰਚਨਾ, ਲੇਖਰਚਨਾ

ਭਾਗ-ਸ

Total Hours: 15

ਸ਼ਬਿ-ਸ਼ਰੇਣੀਆਂ

ਪੂੰਜਾਬੀ ਭਾਸ਼ਾ ਵਿੱਕ ਬਣਤਰ

Transactional Mode

ਲੈਕਚਰ, ਵਿਆਵਖ ਆਵਿਧੀ, ਸਮਿੱਵਸ ਆਹਿੱਲ, ਵਮਸ਼ਰਤਵਸਖਲਾਈ, ਸਮਹਚਰਚਾ, ਪਰਿਰਸ਼ਨ, ਪੀ.ਪੀ.ਟੀਅਤੇ

ਕਾਰਜਸੌਪਣੀ, ਸੁੰਿਆਵਿਧੀ।

Suggested Readings

- ਰਾਵਜ਼ੀਰ ਪਾਲਵਸੁੰਘ ਬਰਾੜ ਅਤੇ ਡਾ. ਜਗਤਾਰਵਸੁੰਘ ਜੋਗਾ (ਸੁੰਪਾਕਿ) (2015): ਿਾਰਤਕ ਵਿੱਕ, ਪਬਲੀਕੇਸ਼ਨ ਵਬਊਰੇ, ਪੂੰਜਾਬੀ ਯਨੀਰਵਸਟੀ, ਪਵਟਆਲਾ।
- ਜੋਵਰਜ਼ੀਰਵਸੁੰਘ ਪੁਆਰ, ਬਲਿੰਵਸੁੰਘ ਚੀਮਾ, ਸੁਖਵਿੰਰਵਸੁੰਘ ਅਤੇ ਿੰਅਗਨੀ ਹੋਤਰੀ

(1932), ਪ੍ਰੰਜਾਬੀਭਾਸ਼ਾ ਵਿਆਕਰਨ (ਭਾਗ- ਪਵਹਲਾ), ਪ੍ਰੰਜਾਬੀਭਾਸ਼ਾਅਕਾਸ਼ਿਮੀ, ਜਲੰਧਰ।

• ਡਾ. ਕਰਮਜੀਤਵਸੰਘ (ਸੁੰਧਾਨਿਕ) (2012), ਕਾਵਿਸੁਮੇਲ, (ਸੁੰਧਾਨਿਕ) , ਪਬਲੀਕੇਸ਼ਨਵਬਊਰੋ, ਪ੍ਰੰਜਾਬ ਯਨੀਰਿਸਟੀ, ਚੰਡੀਗੜ੍ਹ।

• ਡਾ. ਹਵਰਕੀਰਤਵਸੰਘ, ਵਗਆਨੀਲਾਲਵਸੰਘਕਾਵਤਜ (1999), ਪ੍ਰੰਜਾਬੀਵਿਆਕਰਨਤੇਲੇਖਮਾਲਾ, ਪ੍ਰੰਜਾਬਸਟੇਟਯਨੀਰਿਸਟੀਟੈਕਸਟਬੁਕਬੋਰਡ, ਚੰਡੀਗੜ੍ਹ।

• ਡਾ. ਹਵਰਕੀਰਤਵਸੰਘ (2003), ਰੁਪਾਂਤਰੀਵਿਆਕਰਨ, ਪ੍ਰੰਜਾਬਸਟੇਟਯਨੀਰਿਸਟੀਟੈਕਸਟਬੁਕਬੋਰਡ, ਚੰਡੀਗੜ੍ਹ।

Course Title: Hindi	L	T	P	Cr.
Course Code: BAD2175	4	0	0	4

Learning Outcomes

Total Hours: 60

ਸੰਪੂਰਨਪਾਠਯਕਰਮਕੇਰੁਚਿਪੂਰਕਭਾਗਅਧਯਨਤਪਰਾਨਤਛਾਤਰਸਮਝਨੇਕੇਯੋਗਯਹੋਯਾਯੋਗੇ :

1ਵਰਧਾਰਥਿਹਿੰਦੀਭਾਸ਼ਾਔਰਤਸਕੀਭਲਵਪਰਬੋਭਲਯੋਕੇਭਾਰੇਮੇਂਯਾਨਸਕੇਂਗੇ

2ਵਰਧਾਰਥਿਹਿੰਦੀਭਾਸ਼ਾਮੇਂਤਪਨਯਾਸਔਰਕਹਾਨੀਕੇਅੰਤਰਕੋਸਮਝਸਕੇਂਗੇ

3ਵਰਧਾਰਥਿਸਮੀਕਸ਼ਾਤਮਕਕਾਯੋਮੇਂਹਿੰਦੀਭਾਸ਼ਾਕਾਪਰਯੋਗਕਰਸਕੇਂਗੇ

4 ਵਰਧਾਰਥਿਹਿੰਦੀਭਾਸ਼ਾਮੇਂਅਨਯਭਾਸ਼ਾਔਕਾਅਨੁਰਾਦਕਰਸਕੇਂਗੇ

Course Content

इकाई (क)

15 Hours

कहानीकी आरम्भकपहान; कहानीकाउद्भ औरवर्कस।

इकाई (ख)

15 Hours

सजीकहाननयाँ : सम्पादकडॉ०लक्ष्मीत्रिरानाद्राराकेलिरिकहाननयाँ

ममता . अभशक्षकतकाहृदय . न्यायमित्री . सभ्य-असभ्य

इकाई (ग)

15 Hours

हिंदीभाषातर्थातसकीबोਭਲਯਾँ,

ਦੇਨਾਗਰੀਭਲਵਪਕਾਉਦਭ ਔਰਵਰਕਸ; ਵਰ੍ਥੇਭਾਏਂਤਰਥਾਸੀਮਾਏਂ,

ਮਾਨਕਹਿੰਦੀ।

इकाई (घ)

15 Hours

उपन्यास और कहानी में अंतर, उद्भ और वर्कास।

अंग्रेजी तर्थाक्षेत्रीय भाषा के अनुच्छेद का हिंदी में अनुवाद।

प्रायोगिक कायय

अपनी पसंद की ननम्र भलखित में से एक कसीसाह हत्यक वर्धा पर तीन मौभल करिनाएँ

भलिं :- (कहानी, लघुकर्था, ननबिंध, सम्राद)।

पुस्तक सूची

• सजीर्कहाननयाँ : सम्पादक डॉ० लक्ष्मी त्रिराना, पब्लिकेशन ब्यूरो, पिंजाब

वर्ध्वर्चालय, ण्डीगढ़।

• दीक्षित भागीरथ : (2003) समीक्षालोक, इत्रप्रस्थ प्रकाशन, हदल्ली,

• राय, गोपाल, 'हिंदी कहानी का वर्कास', राजकमल प्रकाशन, हदल्ली : 2012

• तुरे दीरामसरूप, 'हिंदी साहस्य और सिंेदना का वर्कास' लोकभारती प्रकाशन,

इलाहाबाद, नर्मसिंकर, 1998.

• मिंगल लालिंदगुप्त 'हिंदी साहस्य का इनतहास', यूननर्भसटणी बुकसेंटर, कुरुक्षेत्र, द्वर्तीय

सिंकर, 1999.

• तुरे दी, राजेश्वर प्रसार; 2008 हहन्दी व्याकर, उपकार प्रकाशन, आगरा।

• बाहरीहरदेर, 2004, हहन्दी उद्भ और वर्कास ककताबमहल, हदल्ली।

Course Title: Communicative English	L	T	P	Cr.
Course Code: BAD2176	4	0	0	4

Total Hours: 60

Learning Outcome

On the completion of the course the students will be able to:

- 1) Demonstrate knowledge of literary genre
- 2) Describe and identify the distinct literary characteristics
- 3) Analyze short stories for their structure and meanings, using correct Terminology
- 4) Apply the sound principles of writing compositions

Course Content

Unit-I

Prose Parables (Orient Blackswan, 2013)-The following stories from the above volume are prescribed:

- The Doctor's Word
- Green Parrots in a Cage
- The Doll's House
- A Service of Love
- Dusk

UNIT - II

Total Hours: 15

The Poetic Palette (Orient Blackswan, 2013) The following poems from this anthology are prescribed:

- Where the Mind is Without Fear: Rabindranath Tagore
- The Soul's Prayer: Sarojani Naidu
- I Sit and Look Out: Walt Whitman
- A Work of Artifice: Marge Piercy
- Whose English Is It Anyway: John Agard
- ArsPoetica: Archibald Macleish

UNIT – III

Total Hours: 15

Texts Prescribed for Grammar, Oxford Practice Grammar by John Eastwood (Exercises 76 to 117)

UNIT – IV

Total Hours: 15

- Writing Skills
- Letters
- Applications
- Essays

Transactional Mode

Video based Teaching, Collaborative Teaching, Cooperative Teaching, Role Play, Demonstration, Project Based Learning, Quiz, Simulation, Lecture method, lecture-cum-demonstration, seminars

Suggested Readings

- Eastwood, J. (2004). Oxford Practice Grammar (With Answers). Second edition, OUP.
- Best, W. D. (1963). The Students' Companion. Longman.

- Tagore, R. (1910). Where the mind is without fear.
- Patel, R. B., & Palanpur, G. I. Rabindranath Tagore's Where the Mind is Without Fear: A Poem with Genuine Concern for the Humanities.
- Baig, T. A. (1974). Sarojini Naidu. Publications Division Ministry of Information & Broadcasting.

Course Title: Teacher and Society	L	T	P	Cr.
Course Code: BAD2177	2	0	0	2

Total Hours: 30

Course Learning Outcomes: After completion of this course, the learner will be able to:

1. Critically examine the relationship between teacher beliefs, values, character, life experiences, and socio-cultural contexts in shaping teaching practices.
2. Explain the diverse roles and characteristics of teachers as communicators, reflective practitioners, learners, leaders, and agents of educational change.
3. Differentiate between curricular and broader educational aims and analyze their influence on the development of self, school, and society.
4. Demonstrate the ability to foster positive learning environments, engage in reflective practice, and understand the role of teacher agency in educational processes and outcomes.

Course content

Unit-I

7Hours

Understanding the Teacher: Exploring the Personal and Professional Teacher

A. Exploring the wider Personal and General Social Context of Teacher: LifeHistory, Teacher Beliefs, Values and Aspirations, Diverse Identities, SocialContexts and Commitment to Learning and Education.

B. Exploring the Professional Teacher: Qualifications, Education in teaching,Attitude, Aptitude, Experience and Exposure.

C. The Charismatic Teacher, the Communicator Teacher, The Missionary Teacher,The Competent Practitioner, The Reflective Practitioner, The Learning Teacher.

D. Reflexive Practice: Nurturing the Professional Capital through collaborativeand/or collective engagement with self, others, the social context.

Unit-II

8Hours

Nurturing the Teacher: A Dialogue beyond the curricular goals, for Life and Posterity

A. Teaching: One profession, many roles

B. Teaching Character: Nurturing Teachers for Human Flourishing.

C. Holistic Teacher Development: Nurturing the Panchakoshas. D. Teacher Values, Beliefs, andcurrent Philosophy of Teaching: A Reflective Dialogue.

E. Developing an Ethic of Care in Teacher Education: Nurturing Teachers towards a pedagogy of care.

Unit-III

8Hours

Understanding and Fostering Teacher Agency: Role in shaping Education Systems of Tomorrow

A. Teacher Agency: What is it and why does it matter?

B. Individual, Cultural and Structural Dimensions of Teacher Agency.

C. Teacher discourses, Philosophy, Relationships, Networks and Professional Development:

Shaping teacher agency and Creative insubordination.

D. Challenges and Issues in fostering Teacher Agency: Performativity, Non-academic engagements, Systemic apathy, Policy and Practice gaps and others.

E. Role of Teacher in shaping the educational policy, practice, and reforms

Unit-IV

7Hours

Teacher as an Architect of the New India: Shaping the Society of Tomorrow

A. Engaging in Critical Education: Dialogues on power relations associated with Gender, Ethnicity, Culture, Disability, Class, Poverty, the reproduction of disadvantage and realizing the true human potential.

B. Being a Critical Teacher: Raising debates around rapid technological advancement and impact on individual, family and social life; the growing isolation and impact on mental and social health and well-being, changing relationships between the 'state' and the 'market' and their impact on formal education; the conceptualization of teacher, teaching and teacher roles, 'globalization' and the reconstructed nationalism shaping the socio-political milieu and impact on social psyche, growing materialistic urge, sensory drives and the gradual deterioration of the individual and societal character.

Transactional mode

Lectures & Seminars, Thinking Exercises & Critical Reflections, Group Work & Case

Studies, Enquiry-Based Learning, Pre-Service Internship Reflections.

Suggested Readings:

- NCTE (2020). *National Education Policy 2020 – Implications for Teachers*.
- Jennifer Nias – *Primary Teachers Talking: A Study of Teaching as Work*
- M. Beattie – *Narratives in the Making: Teaching and Learning at Cork town Community High School*
- Lee S. Shulman – *Knowledge and Teaching: Foundations of the New Reform*
- Parker J. Palmer – *The Courage to Teach: Exploring the Inner Landscape of a Teacher's Life*
- Andy Hargreaves & Michael Fullan – *Professional Capital: Transforming Teaching in Every School*
- Donald A. Schön – *The Reflective Practitioner: How Professionals Think in Action*
- John Dewey – *How We Think*
- Nel Noddings – *Caring: A Relational Approach to Ethics and Moral Education*
- Sri Aurobindo – *The Integral Education: A Foundation for a Holistic Approach*
- Sharma, R. A. (2019). *Teacher in Emerging Indian Society*. Surya Publications.
- Krishna Kumar – *Education and the Significance of Life*

- *G. Nagarjuna – Philosophy of Education: Indian Semester Perspectives*

Course Title: Understanding India (Indian ethos and knowledge systems)	L	T	P	Cr.
Course Code: BAD2178	2	0	0	2

Total Hours: 30

Course Learning Outcomes: After completion of this course, the learner will be able to:

1. Recognize and appreciate the richness and diversity of Indian knowledge traditions, cultural practices, and their contributions to society.
2. Analyze multidisciplinary themes related to Indian culture, science, technology, and lifestyle using research and critical thinking skills.
3. Explain the contributions of India in fields such as mathematics, natural sciences, astronomy, technology, and linguistic traditions.
4. Communicate and disseminate knowledge of Indian traditions, culture, and heritage in an accessible and meaningful manner to diverse learners.

Course Content

Unit-I

Total Hours: 7

Introduction of Knowledge of India

- A. Recap of the previous semester's definition and introduction.
- B. Recap of previous knowledge.

UNIT - II

Total Hours: 8

Culture - Art and Literature

- A. Food (regional cuisines, ayurvedic diet, food and festival, vegetarianism, Jainism in food, food and hospitality, and globalization).
- B. Clothes (traditional Indian clothing, textile arts, religious costumes, clothing status, clothing, gender, globalization in clothing).
- C. Sports (traditional Indian sports, martial arts, sports, and gender, sports & globalization).
- D. The lifestyle of Yoga; adapting ancient lifestyle – A path towards longevity.

UNIT – III

Total Hours: 8

Science & Technology

- A. Arithmetic and logic.
- B. Natural sciences: math, physics, metallurgy, and chemistry.
- C. Astronomy: India's contributions to the world.
- D. Indian notions of time and space.
- E. Technology in the economy: agriculture, transportation, etc.

UNIT – IV

Total Hours: 7

Linguistic Traditions

- A. History of linguistics in India (conceptualizing ancient Indian linguistics, oral traditions, etc.).
- B. Language as Culture: Evolution of Languages over the years & language as building blocks to different cultures and society
- C. Language: Identity, culture, and History.

Suggestive Mode of Transaction:

- Lectures will include learner-driven participatory sessions, and Guest lectures through experts and practitioners, such as fine arts and performing arts practitioners along with contemporary poets & writers of Indian literature.
- Tutorials will include Screening of documentaries and films followed by a discussion;
- Learner-driven discussions in the form of focus group discussions (FGDs), Socratic Discussions, etc.;
- Debate/discussion can be organized to explain India's Vaad tradition;
- Discuss on how some of the ancient methods of teaching are relevant in today's time;
- Discussions that help Identify ethical dilemmas in daily lives and understanding the importance of ancient ethics and values to resolve them.

SUGGESTIVE READINGS:

- Chatterjee, S., & Datta, D. M. (1984). *An introduction to Indian philosophy*. University of Calcutta Press.
- Dasgupta, S. N. (1922). *A history of Indian philosophy* (Vol. 1-5). Cambridge University Press.
- Easwaran, E. (2007). *The Bhagavad Gita* (2nd ed.). Nilgiri Press.
- Feuerstein, G. (2003). *The yoga tradition: Its history, literature, philosophy, and practice*. Hohm Press.
- Ghurye, G. S. (1959). *Caste and race in India*. Popular Prakashan.
- Radhakrishnan, S. (1953). *Indian philosophy* (Vol. 1 & 2). George Allen & Unwin.
- Raghuramaraju, A. (2006). *Indian philosophy: A counter perspective*. Sage Publications.
- Sarma, S. R. (2006). *The science and technology of ancient India*. University Press.
- Singh, K. (1990). *The Hindu way of life*. HarperCollins Publishers.
- Jayaraman, K. (2014). *Food and faith in Christian culture*. Cambridge University Press.