SHARDA UNIVERSITY
Beyond Boundaries

Programme Structure

School of Education

B.Sc. B.Ed. (Integrated)

(Medical/Non-Medical

Programme Code- SOE0102   Duration- 4Years Full Time

Batch -2020-2024

1. Standard Structure of the Program at University Level

1.1 Vision, Mission and Core Values of the University

Vision of the University

To serve the society by being a global University of higher learning in pursuit of academic excellence, innovation and nurturing entrepreneurship.

Mission of the University

1. **Transformative educational experience**
2. **Enrichment by educational initiatives that encourage global outlook**
3. **Develop research, support disruptive innovations and accelerate entrepreneurship**
4. **Seeking beyond boundaries**

Core Values
- **Integrity**
- **Leadership**
- **Diversity**
- **Community**

1.2 Vision and Mission of the School

Vision of the School

To serve the society by being a global University of higher learning in pursuit of academic excellence, innovation and nurturing entrepreneurship.

Mission of the School

- To provide an exposure in experience -based learning for multifaceted development of prospective teachers.

- To contribute to societal and national needs by developing teachers who are equipped with 21st century skills and are proficient with the integration of technology in the field of Education.

- To facilitate and undertake research, development and training for the improvement of school education.

- To engage the students in innovative teaching practices for becoming effective teachers and productive entrepreneurs.

Core Values
- **Integrity**
- **Leadership**
- **Diversity**
- **Community**

1.3 Programme Educational Objectives (PEO's)

PEO 1: To integrate general studies comprising science, social science humanities and professional studies to provide a strong foundation to future teachers.

PEO 2: To maintain a balance between theoretical and practical components of the programme, thus representing a wide knowledge base of a school teacher.
.
PEO 3: To endow prospective teachers with competencies, skills and research work needed for becoming an effective, competent and committed teacher for upper primary and secondary stages of school education.

PEO 4: To equip prospective teachers with integrity, inclusiveness and ethical values to sensitize them about emerging issues such as environment, gender equality, human rights etc. in order to make them responsible citizens.

1.3.3 Programme Outcomes (PO's)

PO1: **Curriculum and Planning**: Pupil teachers will be able to **design** meaningful goals and objectives for learning by applying the knowledge of core content and pedagogy.

PO2: **The Learner and Learning Environment**: Pupil teachers will be able to **develop** an understanding of cognitive, social and emotional skills. They will be able to **assess** individual differences, which will help them to get an understanding of how students come to view, develop and make sense of subject matter.

PO3: **Teaching**: Pupil teachers can deliver meaningful learning to students by integrating their knowledge of content, pedagogy, learner, learning environment, engaging in reflective instructional cycle of planning, instructing, assessing and applying various strategies of assessment for teaching

PO4: **Professional responsibilities for School and Community**: Pupil teachers will be able to **build** teacher leadership qualities by participating in the development and/or implementation of school-wide mission, strategic planning/improvement process, curriculum initiatives, student support and management systems. Thus, maintaining an environment that fosters student learning and demonstrating a commitment to ethical and responsible behavior.

PO5: **Professional responsibilities towards ICT in teaching**: Pupil teachers will be **adapted** to use the ICT effectively so as to design, implement and assess learning experience to enrich their professional experience and to provide positive models for students, colleagues and the community.

PO6: **Culturally Responsive Teaching practice/ Inclusive Education**: Pupils will **formulate** culturally responsive teaching practices to help all students regardless of barriers related to race, geographic location, special needs and economic background.

PO7: **Research:** The pupil teacher will be able to do Action research to scientifically solve the problems that occur during the classroom teaching, presentation and achieving learning objectives.

Programme Specific Objectives (PSO's)

PSO1 : To enable students to become knowledgeable and skilled at both the science streams (Medical and Non-Medical) and at the pedagogy.

PSO2 : To enable students to be able to integrate theoretical and practical knowledge of their respective subjects in classroom practices.

PSO3 : To enable students to apply their knowledge of core content and pedagogy to set goals and objectives for learning based on curriculum and design instruction that engages students in meaningful learning activities.

PSO4 : To enable students to identify the diversity of learners and create appropriate learning environment to ensure equal opportunities of learning of all students.

FOUR YEAR BSc. B.Ed. INTEGRATED COURSE AT A GLANCE

Semester	I	II	III	IV	V	VI	VII	VIII	Total
Courses	11	13	11	11	10	9	6	9	80
Credits	28/30	31/31	30/32	25/25	25/27	26/25	20	24/24	209/214

SEMESTER-1

	SUBJECT CODE	NAME OF THE SUBJECTS	TEACHING LOAD			CREDITS	Core/Elective Pre-requisite/ Co Requisite	Type of Course[1]: 1. CC 2. AECC 3. SEC 4. DSE
			L	**T**	**P**			
THEORY SUBJECTS								
1	BSI 105/ BSI 106	Mechanics/ Cell Biology	4/4	0	0	4/4	Core	CC
2	BSI 107	Atomic Structure and Bonding	4	0	0	4	Core	CC
3	BSI 108/ BSI 109	Calculus- 1 and Matrix/ Biomolecules	4/4	1/0	0	5/4	Core	CC
4	BSI 110/ BSI 111	Diversity of Animals/ Diversity of Plants	3	0	0	2	Core	DSE
5	SEB 103	Language Across the Curriculum	3	0	0	3	Core	CC
6	SEB 104	Communication in Teaching learning Process	3	0	0	3	Core	AECC
7		ICT Skill Based -MOOCs- SWAYAM	4	0	0	4	SEC	SEC
8		Chemistry - MOOCs- SWAYAM	3	0	0	3	Core	CC
PRACTICAL SUBJECTS								

10	BSP 111/ BSP 112	Physics Practical / Cell Biology LAB C	0	0	2/2	1/1	Core	CC
11	BSP 113	Chemistry Practical	0	0	2	1	Core	CC
12	BSP 114	Biomolecule Lab	0	0	2	1	Core	CC
TOTAL CREDITS						**28/30**		

CC: Core Course, AECC: Ability Enhancement Compulsory Courses, SEC: Skill Enhancement Courses, DSE: Discipline Specific Course

SEMESTER II

S. NO.	SUBJECT CODE	NAME OF THE SUBJECTS	TEACHING LOAD			CREDITS	Core/Elective Pre-requisite/ Co Requisite	Type of Course[1]: 1. CC 2. AECC 3. SEC 4. DSE
			L	T	P			
THEORY SUBJECTS								
1	BSI 112/ BSI 113	Elasticity, Waves Heat and Thermodynamics / Bioanalytical techniques	4/4	0	0	4/4	Core	CC
2	BSI 114/ BSI 115	Calculus –II Analytical Geometry and Number Theory /Microbiology	4/4	1/0	0	5/4	Core	CC
3	BSI 116	States of Matter and Nuclear Chemistry	4	0	0	4	Core	CC
4	BSI 117/ BSI118	Energy Harvesting and Conservation/Nuclear and Particle Physics	3	0	0	2	DSE	DSE
5	SEB 102	Basic Philosophical and Sociological Concepts in Education	4	0	0	4	Core	CC
6	SEB 106	Contemporary India and Education	4	0	0	4	7Core	CC
7	EVS 103	Environmental Science	2	0	0	2	Co Requisite	SEC
8	SEB105	Professional Ethics	2	0	0	2	Pre-requisite	AECC

9		OPE-1	0	0	2	2	Co Requisite	AECC
PRACTICAL SUBJECTS								
10	BSP 115	Physics Practical	0	0	2	1	Core	CC
11	BSP116	Bioanalytical Techniques Lab	0	0	2	1	Core	CC
12	BSP117	Chemistry Practical	0	0	2	1	Core	CC
13	BSP118	Microbiology Lab	0	0	2	1	Core	CC
TOTAL CREDITS						**31/31**		

CC: Core Course, AECC: Ability Enhancement Compulsory Courses, SEC: Skill Enhancement Courses, DSE: Discipline Specific Courses

SEMESTER III

S. NO.	SUBJECT CODE	NAME OF THE SUBJECTS	TEACHING LOAD			CREDITS	Core/Elective Pre-requisite/ Co Requisite	Type of Course[1]: 1. CC 2. AEC C 3. SEC 4. DSE
			L	T	P			
THEORY SUBJECTS								
1	BSI 205/ BSI 206	Electricity and Electromagnetism / Mycology and Phycology	4/4	0	0	4/4	Core	CC
2	BSI 207	Organic Chemistry -1	4	0	0	4	Core	CC
3	BSI 208/ BSI 209	Real Analysis/ Non- Chordates	4/4	1/0	0	5/4	Core	CC
4	SEB101	Human Development, Learning, Cognition and Diversity in Education	4	0	0	4	Core	CC
PRACTICAL SUBJECTS								
5	BSP 211/ BSP212	Physics Practical/ Phycology and Mycology Lab	0	0	2/3	1/2	Co Requisite	CC
6	BSP213	Chemistry Practical	0	0	2	1	Co Requisite	CC
7	BSP214	Non -Chordates Lab	0	0	3	2	Co Requisite	CC

8	BSP215	School Attachment Programme and Community Living	0	0	0	2	Pre requisite	CC
9	SEP101	EPC:1-Reading and Reflecting on Text	0	0	3	2	Co Requisite	SEC
10	--------	MOOCs -SWAYAM -Math/Zoology	3/3	0	0	3/3	Co Requisite	CC
11	OPE-2	Open Elective	4	0	0	4	Co Requisite	CC
TOTAL CREDITS						**30/32**		

CC: Core Course, AECC: Ability Enhancement Compulsory Courses, SEC: Skill Enhancement Courses, DSE: Discipline Specific Courses

SEMESTER IV

S. NO.	SUBJECT CODE	NAME OF THE SUBJECTS	TEACHING LOAD			CREDITS	Core/Elective Pre-requisite/ Co Requisite	Type of Course[1]: 1. CC 2. AECC 3. SEC 4. DSE
			L	T	P			
THEORY SUBJECTS								
1	BSI 210/ BSI211	Optics/ Developmental Biology of Angiosperms	4/4	0	0	4/4	Core	CC
2	BSI212	Thermodynamics, Equilibrium and solutions	4	0	0	4	Core	CC
3	BSI213/ BSI214	Differential Equations /Diversity of Chordates	4/4	1/0	0	5/4	Core	CC
4	BSI215/	Linear Algebra/MOOCs	3	0	0	2	DSE	DSE
5	SEB108	Knowledge, Disciplines and school Subjects	3	0	0	3	Core	CC
PRACTICAL SUBJECTS								
7	BSP215	Developmental Biology of Plants Lab	0	0	3	2	Co Requisite	CC
8	BSP216	Physics Practical	0	0	2	1	Co Requisite	CC

9	BSP217	Chemistry Practical	0	0	2	1	Co Requisite	CC
10	BSP218	Biology of Chordates Lab	0	0	3	2	Co Requisite	CC
11	SEP103	EPC:2 Arts in Education	0	0	3	2	Co Requisite	SEC
12	--------	MOOC -SWAYAM- Physics /Botonny Discipline Specific	3/3	0	0	3/3	Co Requisite	AECC
TOTAL CREDITS						**25/25**		

CC: Core Course, AECC: Ability Enhancement Compulsory Courses, SEC: Skill Enhancement Courses, DSE: Discipline Specific Courses

SEMESTER V

S.NO.	SUBJECT CODE	NAME OF THE SUBJECTS	TEACHING LOAD			CREDITS	Core/Elective Pre-requisite/ Co Requisite	Type of Course[1]: 1. CC 2. AECC 3. SEC 4. DSE
			L	T	P			
THEORY SUBJECTS								
1	BSI301/ BSI302	Atomic and Molecular Physics/ Plant Biotechnology (BOTANY)	4/4	0	0	4/4	Core	CC
2	BSI303	Transition of elements, Coordinates, compounds and Chemical Kinetics	4	0	0	4	Core	CC
3	BSI304/BSI305	Multivariate Calculus and Vector Analysis / Comparative Anatomy of Vertebrates(zoology)	4/4	1/0	0	5/4	Core	CC
4	BSI306/ BSI 307	Electrochemical and Photo Chemicals/Soil Chemistry	3	0	0	2	DSE	DSE
5	SEB107	Assessment for learning	4	0	0	4	Core	CC
PRACTICAL SUBJECTS								
6	BSP301/ BSP302	Physics Practical/ Plant Biotechnology	1/3	0	0	1/2	Co Requisite	CC
7	BSP303	Comparative Anatomy of Vertebrates Lab	0	0	3	2	Co Requisite	CC
8	BSP304	Chemistry Practical	0	0	2	1	Co Requisite	CC
9	BSP305	School Attachment Programme and Community Living	0	0	4	2	Pre-requisite	CC
10	-	MOOCs -SYAYAM-Chemistry	0	0	0	3	Co Requisite	AECC
TOTAL CREDITS						**25/27**		

5.CC: Core Course, AECC: Ability Enhancement Compulsory Courses, SEC: Skill Enhancement Courses, DSE: Discipline Specific Courses

SHARDA UNIVERSITY
Beyond Boundaries

SEMESTER VI

S. NO.	SUBJECT CODE	NAME OF THE SUBJECTS	TEACHING LOAD			CREDITS	Core/Elective/ Pre-requisite/ Co Requisite	Type of Course[1]: 1. CC 2. AECC 3. SEC 4. DSE
			L	T	P			
THEORY SUBJECTS								
1	BSI308/BSI309	Classical and Quantum Mechanics/Plant systematics	4	0	0	4	Core	CC
2	BSI310	Organic Chemistry II	4	0	0	4	Core	CC
3	BSI311/BSI312	Groups and Rings / Animal Biotechnology	4/4	1/0	0	5/4	Core	CC
4	SEB109	Pedagogy of School Subject – 1 Physical Science	4	0	0	4	Core	CC
5	SEB115/ SEB116	Pedagogy of School Subject – 2 Mathematics/ Biological Science	4	0	0	4	Core	CC
PRACTICAL SUBJECTS								
6	BSP306	Physics Practical	0	0	2	1	Co Requisite	AECC
7	BSP307	Plant Systematics Lab	0	0	3	2	Co Requisite	AECC
8	BSP308	Animal Biotechnology Lab	0	0	3	2	Co Requisite	AECC
9	BSP309	Chemistry Practical	0	0	2	1	Co Requisite	AECC
TOTALCREDITS						**26/25**		

6.CC: Core Course, AECC: Ability Enhancement Compulsory Courses, SEC: Skill Enhancement Courses, DSE: Discipline Specific Course

SEMESTER VII

S. N. O.	SUBJECT CODE	NAME OF THE SUBJECTS	TEACHING LOAD			CREDITS	Core/Elective/ Pre-requisite/ Co Requisite	Type of Course[1]: 1. CC 2. AECC 3. SEC 4. DSE
			L	T	P			
1	**SEP201**	Pre-Internship	0	0	0	2	Co Requisite	AECC
2	**SEP207**	Pedagogy of School Subject –I	0	0	0	5	Core	SEC
3	**SEP208**	Pedagogy of School Subject –II	0	0	0	5	Core	SEC
4	**SEP204**	Engagement with the Field: Tasks and Assignments related to internship	0	0	0	2	Pre-requisite	AECC
5	-	SWAYAM / MOOCs Physics/Botany	3	0	0	3/3	Co Requisite	AECC
6	-	Maths/ Zoolog	3	0	0	3/3	Core	AECC
Total Credits						**20**		

SEMESTER VIII

S. No.	Subject Code	Subjects	Teaching Load			Credits	Core/Elective Pre-Requisite/ Co Requisite	Type of Course[1]: 1. CC 2. AECC 3. SEC
			L	T	P			
THEORY SUBJECTS								
1	SEB201	Gender, School and Society	3	0	0	3	CORE	CC
2	SEB202	Creating an Inclusive School	3	0	0	3	CORE	CC
4	BSI401/ BSI402	Nuclear and Practical Physics/Principles of Genetics	4/4	0	0	4/4	CORE	CC
3	SEB203	Entrepreneurship Education: Enabling Teachers	2	0	0	2	Co-Requisite	AECC
4	SEB204	EPC4: Yoga and Health Education	2	0	0	2	Co-Requisite	AECC
5	SEP205	EPC 3: Understanding the Self	0	0	4	2	Co-Requisite	AECC
6	SEP206	Project	0	0	4	2	Co-Requisite	AECC
7	CCU 801	Community Connect	0	0	4	2	Co-Requisite	SEC
Optional Courses (*Student will select any one of the subjects given*)								
8	SEB205	Peace Education	4	0	0	4	Generic Elective	DSE
	SEB206	Life Skills Education	4	0	0			
	SEB207	Guidance and Counseling	4	0	0			
Total Credits						**24/24**		

[8]CC: Core Course, AECC: Ability Enhancement Compulsory Courses, SEC: Skill Enhancement Courses, DSE: Discipline Specific Courses

NOTE- OPEN ELECTIVE FOR OTHER SCHOOLS- *1*. LIFE SKILLS FOR DISASTER PREPAREDNESS / PSYCHOLOGY FOR HEALTH AND WELL-BEING

SEMESTER 1

BSI 105: MECHANICS

School: SOE	Batch: 2020-24
Program: B.Sc. B.Ed.	Current Academic Year: 2020-21
Branch: Education	Semester: I
Course Code	BSI 105
Course Title	Mechanics
Credits	4
Contact Hours (L-T-P)	4L+ 0T +0P
Course Status	Compulsory
Course Objectives	1. To study the concepts of vector analysis. 2. To understand the Newtonian mechanics and principles of natural physical phenomena. 3. To develop an understanding about the rotational and harmonic motion. 4. To develop the capacity to appreciate the oscillatory motion 5. To develop the concept of work and energy.
Course Outcomes	After the completion of this course, the student will be able to CO1: explain mechanics with vector algebra and can apply it on real life problem. CO:2 articulate and describe the Relative motion. Inertial and non-inertial reference frames. CO3: describe real life applications of rotational mechanics and simple harmonic motion. CO4: analyse the phenomena of oscillatory motion and principles to understand the physical world. CO5: define the concept of motion, work, energy, momentum and frame

	of references.
Course Description	This course is designed to make students proficient in mechanics, especially rotational mechanics with vector treatment. They also learn about simple harmonic motion and work and energy.
Course Outlines	
Unit 1	**VECTOR ANALYSIS**
A	• Vectors: Vector and scalar products. Scalar triple product and Vector triple product. Differentiation of a vector with respect to scalars.
B	• Gradient, Divergence, Curl definitions, physical meaning, and operations, Laplacian, Line, Surface, and Volume integrals.
C	• Gauss', Stokes, and Greens theorem. Ordinary Differential Equations: 1st order homogeneous differential equations.
Unit 2	**MECHANICS OF PARTICLES**
A	• Laws of Motion: Newton's Laws of motion. Frames of reference, inertial and non-inertial pseudo forces, Galilean transformations; Galilean invariance, Dynamics of a system of particles. Centre of Mass.
B	• Momentum and Energy: Principle of conservation of momentum for a system of particle,
C	• Work and Kinetic Energy Theorem. Conservative and non-conservative forces. Conservation of energy. Momentum of variable-mass system: motion of rocket.
Unit 3	**ROTATIONAL DYNAMICS**
A	• Rotational Motion: Angular velocity and angular momentum of a particle and system of particles. Torque. Principle of conservation of angular momentum.

B	• Gravitation: Newton's Law of Gravitation. Central force and motion of a particle in a central force field (motion is in a plane).
C	• Kepler's laws of planetary motion. Satellite in circular orbit and applications. Geosynchronous orbits. Weightlessness.
Unit 4	**OSCILLATIONS**
A	• Simple Harmonic Motion (Basic idea)
B	• Differential equation of SHM and its solutions (simple pendulum, compound pendulum, loaded spring)
C	• Differential equation of SHM and its solutions (simple pendulum, compound pendulum, loaded spring);
Unit 5	**WORK AND ENERGY**
A	• Kinetic and Potential Energy, Total Energy and their time averages.
B	• Linearity and Superposition Principle. (1) Oscillations having equal frequencies and (2) Oscillations having different frequencies
C	• Lissajous figures with equal an unequal frequency and their uses. Damped vibrations (Beats), Forced vibrations
Mode of Examination	Theory

Weightage Distribution	CA	MTE	ETE
	30%	20%	50%

Text books*	H C Verma, Concepts of Physics, Bharati Bhawan; Revised Reprint 2015 edition
Other References	• David Halliday, Robert Resnick and Jearl Walker, Fundamentals of Physics, 6th • Edition, John Wiley and Sons Inc. • Harris Benson, University Physics, Revised Edition, John Wiley and Sons, Inc. • FW Sears, MW Zemansky and HD Young, University Physics,

	1986. Addison-Wesley.
	• K. R. Symon, Mechanics, Addison Wesley, 1971. • Basudeb Bhattacharya,Engineering Mechanics, 2nd edn., 2015, Oxford University Press • Ronald Lane Reese, University Physics, 2003, Thomson Brooks/Cole • Y. R. G. Takwale and P. S. Puranik, Introduction to classical mechanics, Tata McGraw • Hill. • 8. Charles Kittel et. al., Mechanics Berkeley Physics course, 2007, Tata McGraw-Hill.

SHARDA UNIVERSITY
Beyond Boundaries

BSI 106: CELL BIOLOGY

School: SOE	Batch: 2020-24
Program: B. Sc. B.Ed.	Current Academic Year: 2020-2021
Branch: Education	Semester: I
Course Code	BSI 106
Course Title	Cell Biology
Credits	4
Contact Hours (L-T-P)	4-0-0
Course Status	Compulsory
Course Objectives	1. To introduce the concept of structure and function of biological cells and its living and non-living parts. 2. To help the students understand metabolic activities of plant and animal cell and the production of ATP. 3. To develop the understanding of transportation processes between cells through plasma membranes and intracellular packaging. 4. To facilitate the in developing the knowledge of different phases of growth cycle and cell division. 5. To develop an understanding of the subject by studying, designing and analyzing different experiments in this most rapidly progressing area of the life sciences, especially the cell components and their molecular mechanism of activities
Course Outcomes	After the successful completion of this course students will be able to: **CO1**. Compare functional similarities between different types of cells and set up experiments for protein estimation. **CO2.** Estimate metabolic activities of plant and animal cell and the production of ATP. **CO3**. Demonstrate transportation processes between cells through plasma membranes and intracellular packaging. **CO4**. Illustrate the different phases of growth cycle and cell division. **CO5**. Perform the cytological experiments to determine cell number and chromosomes in plant cells. **CO6**. Recognize the cell nucleus and identify the process of Meiosis and Mitosis.
Course Description	The 'Cell Biology' course outlines the definition and study of the internal

organization of the eukaryotic cell, organelle and membrane function, cell-cell signaling, cell movement, cell adhesion, the extracellular matrix

Course syllabus	
Unit 1	**Cell and Cell Theory**
A	Cell as a basic unit of life, Cell theory, Cell size and shape
B	Prokaryotic and Eukaryotic cells
C	Different types of cells
Unit 2	**Ultra-Structure of cell**
A	Plasma membrane, Ribosomes
B	Protein sorting and transportation; Endoplasmic Reticulum, Golgi Apparatus, Lysosomes;
C	Bioenergetics and Metabolism, Mitochondria, Chloroplast, Peroxisomes Bioenergetics and metabolism, Mitochondria, Chloroplast, peroxisomes
Unit 3	**Nucleus and Chromosome**
A	Ultra-structure of nucleus, nuclear membrane
B	Chromosome structure, Centromeres, Telomeres
C	Euchromatin and heterochromatin, Polytene and Lampbrush chromosomes
Unit 4	**Cell Cycle**
A	Growth cycle – concept, phases
B	Cell division- concept
C	Significance of Cell Division
Unit 5	**Mitosis and Meiosis**
A	Mitosis and its significance
B	Meiosis and its significance
C	Difference between mitosis and meiosis, Role of mitosis and meiosis in inheritance

Mode of Examination	Theory		
Weightage Distribution	CA	MTE	ETE
	30%	20%	50%
Text book/s*	• Starr C. and Taggard R., "Cell Biology and Genetics", Thomson Learning, 2001		
Other References	• Karp Gerald • Cooper GM the Cell • Benjamin, Pierce • Starr C. and Taggard R., "Cell Biology and Genetics", Thomson Learning, 2001		

BSI 107: ATOMIC STRUCTURE AND BONDING

School: SOE	Batch: 2020-24
Program: B.Sc. B.Ed.	Current Academic Year: 2020-21
Branch: Education	Semester: I
Course Code	BSI 107
Course Title	ATOMIC STRUCTURE AND BONDING
Credits	4
Contact Hours (L-T-P)	4L+ 0T +0P
Course Status	Compulsory
Course Objectives	1. To study the atomic and molecular structure with general properties of the molecules. 2. To develop a basic understanding of quantum chemistry and its application. 3. To apply this knowledge to understand different bonding theories and chemical reactions. 4. To develop the conceptual perspective of the molecular orbital theory and hybrid orbitals. 5. To develop the understanding about atomic structure, bonding, molecular structure, and properties of s and p block elements.
Course Outcomes	After the completion of this course, the student will be able to **CO1**. Correlate the atomic structure, basics of quantum chemistry and its applications **CO2**. Explain theories of chemical bonding and their limitations, types of chemical bonds **CO3.** Differentiate the molecular orbital theory and hybrid orbitals **CO4**. Determine the periodicity of block elements, ionization and electron affinity

	CO5. Interpret the periodicity of p block elements
Course Description	This course covers fundamental principles and laws of chemistry. which include electronic configurations of the atomic structure, periodicity, chemical reactions and chemical bonding.

Course Outlines

Unit 1	**ATOMIC STRUCTURE**
A	• Drawbacks of classical theory and origin of quantum mechanics, Bohr's model of hydrogen atom and its limitations. De Broglie hypothesis and Heisenberg uncertainty principle.
B	• Schrodinger wave equation and its importance, physical interpretation of the wave function, postulates of quantum mechanics, particle in one dimensional box. Radial wave functions, angular wave functions.
C	• Quantum numbers and their importance, atomic orbitals and shapes of s, p, d orbitals , Aufbau and Pauli exclusion principles and Hund's multiplicity rule- Electronic configurations. Explanation for the stability of completely filled and half-filled shells with examples.
Unit 2	**CHEMICAL BONDING**
A	• Chemical bond as a basis for predicting the properties which should be expected for a given chemical substance. Ionic bond and its properties and Ionic Solids, Ionic structures, lattice energy and Born-Haber cycle, solvation energy and solubility of ionic solids,
B	• polarizing power and polarizability of ions, Fajan's rule, Covalent Bond and its properties.
C	• Valence bond theory and its limitations, directional characteristics of covalent bond, various types of hybridization and shapes of simple inorganic molecules and ions. Valence shell, electron pair repulsion (VSEPR) theory to NH_3, H_3O^+, SF_4, CIF_3, ICl_2, and H_2O.
Unit 3	**MOLECULAR ORBITAL THEORY**
A	• Molecular orbital theory- criteria for forming M.O. from A.O., construction of M. O's by LCAO

B	• Physical picture of bonding and antibonding wave functions, concept of s, s*, p, p* orbitals and their characteristics.
C	• Hybrid orbitals-sp, sp2, sp3; comparison of M.O. and V.B. Models. Discussion about homonuclear (He_2, N_2, O_2, F_2, C_2) and heteronuclear (CO) diatomic molecules, bond Order and bond energy.
Unit 4	**PERIODIC PROPERTIES AND s-BLOCK ELEMENTS**
A	• Atomic radii, Covalent radii, ionic radii and Vander Waal's radii-definition with explanation with examples in a group and period. Explanation of observed trends. Comparison of the ionic size of atoms with the corresponding anion and cation. Variation of ionic radii in isoelectronic ions.
B	• Ionization energy: Definition, the factors influencing ionization energy, trend in group and period Effect of the size and electronic configuration on successive ionization energies.
C	• Electron affinity: Definition, variation in a group and in a period. Electronegativity: Definition, variation in a group and in a period (observed trends in the values to be accounted for), calculation of electronegativity by Pauling and Mulliken methods. Comparative study of s-Block Elements, diagonal relationships. Anomalous properties of Lithium and Beryllium.
Unit 5	**p-BLOCK ELEMENTS**
A	• Physical and Chemical characteristics of p-Block elements and their compounds.
B	• Comparative study (including diagonal relationships) of group 13-17 elements, compounds like hydrides, oxides, oxyacids and halides of groups 13-16.
C	• Basic properties of halogens. Structure and bonding of diborane. Structure of fluorides and oxyfluorides of Xenon.
Mode of Examination	Theory
Weightage Distribution	CA MTE ETE

	30%	20%	50%
Text books*		• Text book of Inorganic Chemistry P.L. Soni Sultan Chand & sons.	
Other References		• University Chemistry: Bruce Mahan • Concise Inorganic Chemistry: J D Lee, fifth Edition, Wiley Publishers • An Introduction to Inorganic chemistry Mackay and Mackay • Advanced Inorganic Chemistry Satya Prakash, G.D.Tuli,S.K. Basu,R.D.Madan • S.Chand & Company Pvt. Ltd. Principles of Physical Chemistry Puri, Sharma, Pathania, 47th Edition, Vishal Publishing Co.	

BSI 108: CALCULUS I AND MATRIX

School: SOE	Batch: 2020-24
Program: B.Sc. B.Ed.	Current Academic Year: 2020-21
Branch: Education	Semester: I
Course Code	BSI 108
Course Title	Calculus I and Matrix
Credits	5
Contact Hours (L-T-P)	4-1-0
Course Status	Core
Course Objectives	1. To develop the understanding of the principles of differential Calculus 2. To enable the students to apply the concepts of Differential calculus 3. To enable the students to Understand Differentiation, Higher derivatives, Leibnitz theorem. Monotone and their functions 4. To help the students to develop an understanding of Techniques of integration, Integration of Rational Functions, Rationalizable Integrals. 5. To develop a conceptual understanding of techniques of calculus and matrix theory in problem solving.
Course Outcomes	CO1To demonstrate the understanding of the principles of differential Calculus CO2To apply the concepts of Differential calculus CO3To analyse the principles of Differentiation, Higher derivatives, Leibnitz's theorem. Monotone I solving the mathematical problems. CO4To relate the Techniques of integration, Integration of Rational Functions, Rationalizable Integrals for problem solving. CO5To generalize the use of calculus and matrix theory in problem solving.
Course Description	This course deals with some basic mathematical ideas and tools which are at the core of any mathematics course. The calculus of functions of one or more variables taught in this course are useful in modelling and analyzing physical phenomena involving continuous change of variables or parameters and have applications in

	various fields and disciplines.
Course Outlines	
Unit 1	**Unit I: Differential calculus**
A	Limits revisited, Continuous functions, Discontinuous functions and types.
B	Differentiation, Higher derivatives, Leibnitz-fs theorem. Monotone functions.
C	Maxima and Minima, Concavity, Convexity and Points of inflection.
Unit 2	
A	Differentiability theorems, Rollef's theorem
B	Mean Value theorems, Taylor's theorem, Maclaurinfs theorem.
C	Taylors's and Maclaurin infinite series, Indeterminate forms.
Unit 3	
A	The integral of a function, Techniques of integration, Integration of Rational Functions, Rationalizable Integrals.
B	Definite Integral, Properties, Definite integral as the limit of a sum, The fundamental theorem of Calculus, Reduction formulae.
C	Area, Volume and Length.
Unit 4	**Matrices. I**
A	Matrices of order mXn, Algebra of matrices, Symmetric and Skew Symmetric, Hermitian and
B	Skew Hermitian matrices and their standard properties, Determinants. Adjoint of a square matrix, Singular and non-singular matrices, Rank of a matrix, Elementary row / column operations.
C	Invariance of rank under elementary operations, Inverse of a non-singular matrix by elementary operations.
Unit 5	**Matrices – II**
A	System of m-linear equations in n-unknowns, Matrices associated with linear equations,
B	Trivial and non-trivial solutions, Criterion for existence of non-trivial solution of

	homogeneous and non- homogeneous systems and their uniqueness
C	Characteristic equation of a square matrix, Eigen values and Eigen vectors. ending a real symmetric matrix, Diagonalization of a real symmetric matrix, Cayley. Hamilton

Mode of Examination	Theory		
Weightage Distribution	CA	MTE	ETE
	30%	20%	50%
References	- Calculus by Anton, Addison-Wiley. - First Course in Calculus, Serge Lang, Addison-Wiley - Calculus by Lipman Bers, Vols. 1 and 2, IBH. - Advanced Calculus, Frank Ayres, Schaum Publishing Co. - Higher Algebra by Bamard and Child, MacMillan India Ltd. - Integral Calculus by Shanthinarayan, S.Chand and Co.Ltd. - Differential Calculus by Gorakhprasad, Pothishala Ltd. - Calculus and Analytical Geometry by Thomas. Finney, Narosa Publishing House. - Algebra by Natarajan, Manicavachagon Pillay and Ganapathy, S. Vishwanath Pvt. Ltd. - Matrices by Frank Ayres, Schaum Publishing Co. - Textbook of Matrix Algebra by Suddhendu Biswas.		

SHARDA UNIVERSITY
Beyond Boundaries

School: SOE	Batch :2020-2024
Program: B.Sc. B.Ed.	Current Academic Year: 2020-2021
Branch: Education	Semester: I
Course Code	BSI 109
Course Title	Biomolecules
Credits	4
Contact Hrs (L-T-P)	4-0-0
Course Status	Compulsory
Course Objectives	1. To study the structure and functions of macromolecules present in biological systems. 2. To develop an Understanding of the general properties of lipids, amino acids and carbohydrates. 3. To develop a conceptual understanding of biological macromolecules 4. To learn the hierarchical level of proteins. 5. To familiarize with the nucleic acid and its structure.
Course Outcomes	After studying this course, students will be able to - CO1: Elaborate upon the concept of structural chemistry and general properties of lipids CO2: Describe the structure, classification and significance of carbohydrates CO3: Analyze the structure and properties of amino acids and proteins CO4. Explain the structure of nucleosides. CO5. Evaluate the structure of nucleotides and stability of DNA backbone. CO6. Summarize the structure, properties and significance of biological macromolecules
Course Description	This course comprises of the structure, function, properties and significance of various macromolecules found in biological systems.

Several different macromolecules viz. lipids, carbohydrates, amino acids, proteins, and nucleic acids will be studied in details.

Course Outline	
Unit 1	**Lipids**
A	Structure and chemistry of fatty acids
B	Saturated and unsaturated fatty acids
C	General properties and structures of phospholipids, sphingolipids and cholesterol
Unit 2	**Carbohydrates**
A	Carbohydrate classification, Monosaccharides; D- and L-designation, Open chain and cyclic structures
B	Structure and biological importance of disaccharides
C	Structural polysaccharides and storage polysaccharides
Unit 3	**Proteins**
A	Amino Acids
B	Classification, Structure and Properties; Proteins: Primary, Secondary,
C	Tertiary and Quaternary Structure; Biological functions of proteins
Unit 4	**Nucleic Acids**
A	Nature of nucleic acids, Structure of purines and pyrimidines
B	Nucleosides – definition and examples
C	Nucleoside structure or arrangement
Unit 5	**Nucleotides**
A	Nucleotides- definition and examples
B	Nucleotide arrangement, difference between nucleoside and nucleotide
C	Stability and formation of phosphodiester linkages

Mode of Examination	Theory		
Weightage Distribution	CA	MTE	ETE
	30%	20%	50%
Text book/s*	Nelson D.L., and Cox M.M., *Lehninger Principles of Biochemistry, 6th Edition.* W. H. Freeman (2012).		
Other References	- Berg J.M., Tymoczko J.L., and Stryer L., *Biochemsitry, 7th Edition.* W. H. Freeman (2010). - Voet D., and Voet J.G., *Biochemistry, 4th Edition.* Wiley (2010)		

SHARDA UNIVERSITY
Beyond Boundaries

BSI 110: DIVERSITY OF ANIMALS

School: SOE	Batch: 2020-2024
Program: B.Sc. B. Ed	Current Academic Year: 2020-21
Branch: Education	Semester: I

Course Code	BSI 110
Course Title	Diversity of Animals
Credits	2
Contact Hours (L-T-P)	3-0-0
Course Status	DSE
Course Objectives	1. To study about the general characteristics of protists, poriferans and cnidarians 2. To understand the general features of Platyhelminthes, aschelminthes and annelids 3. To understand the diversity of arthropods, molluscs, and echinoderms 4. To learn about the salient features of protochordates, pisces and amphibians. 5. To understand the salient features of whole animal world
Course Outcomes	After successfully completion of this course students will be able to: CO1: To describe and compare the general characteristics of protists, poriferans and cnidarians. CO2: To distinguish the general features of Platyhelminthes, aschelminthes and annelids. CO3: To explain the diversity of arthropods, molluscs, and echinoderms. CO4: To elaborate upon the salient features of protochordates and Pisces CO5: To list the features of amphibians CO6: To describe upon the basic concept of animal world.
Course Description	The 'Diversity of Animals' course outlines the general characteristics of different animal phylum and also provides the basic knowledge of

different animal species affecting human beings. The course covers whole non-chordates and chordates with brief discussion about important species.

Course Outlines	
Unit 1	**Diversity of Protista, Porifera and Radiata**
A	Basic introduction to non-chordates and chordates
B	General Characteristics of Protista,
C	Porifera and Cnidarians
Unit 2	**Diversity of Platyhelminths, Aschelminthes and Annelids**
A	General features of Platyhelminthes and Life cycle of *Taeniasolium*
B	General Characteristics of Aschelminthes, Life cycle of *Ascaris*
C	General characteristics of Annelids,
Unit 3	**Diversity of Arthropods, Mollusca and Echinodermata**
A	General characteristics of Arthropods
B	General features of Mollusca
C	General characteristics of Echinodermata
Unit 4	**Diversity of Protochordates and Pisces**
A	General features of *protochordates*
B	General features of *Branchiostoma*
C	General characteristics of Pisces
Unit 5	**Diversity of Amphibian**
A	General features of Amphibian
B	Classification of Amphibians
C	Life cycle of Amphibians

Mode of examination	Theory		
Weightage Distribution	CA	MTE	ETE
	30%	20%	50%
Textbook/s*	Cleveland P. Hickman, Jr., Larry S. Roberts, Allan Larson (2003). Animal Diversity. 3rd Edition. McGraw−Hill		
Other References	1. Ruppert, F & Barnes. (2006). Invertebrate Zoology. A Functional Evolutionary Approach. 7th Edition. Thomas Books/ Cole. 2. Campbell & Reece. (2005). Biology. Singapore Pvt. Ltd.		

SHARDA UNIVERSITY
Beyond Boundaries

BSI111: DIVERSITY OF PLANTS

School: SOE	Batch :2020-2024
Program: B. Sc. BED	Current Academic Year:2020-2021
Branch: Education	Semester: I
Course Code	BSI 111
Course Title	Diversity of Plants
Credits	2
Contact Hours (L-T-P)	3-0-0
Course Status	Compulsory
Course Objectives	1. To understand the fundamental knowledge of plants. 2. To develop an understanding about the morphology of Algae, fungi, archegoniate, bryophytes, pteridophytes and angiosperms. 3. To develop critical understanding of the characteristics, habitats and economic importance of Algae. 4. To Construct the knowledge about the diversity of plant life of Algae, Fungi, Bryophytes, Pteridophytes and Angiosperms plant habitats. 5. To Familiarize general characteristics, life cycle, habitats and Economic importance of various plant category.
Course Outcomes	After the successful completion of this course students will be able to: CO1: Describe the characteristics, habitats and economic importance of Algae. CO2: Explain the general features, structure, classification and economic importance of fungi. CO3: Analyze the archegoniate unique characteristics, habitats and their generations. CO4: Compare the variations in bryophytes and pteridophytes with respect to their phenotypes as well as genotype.

	CO5: Describe angiosperms; Analyse the variations of monot and dicot along with illustration.
	1. CO6: Explain morphology of Algae, fungi, archegoniate, bryophytes, pteridophytes and angiosperms.
Course Description	The 'Diversity of Plants' course outlines the basic structure of algae, fungi and angiosperms. This course sheds light upon the detailed morphology and anatomy of plant categories. The course also further defines various plant phenotypic features and life cycle.

Course Outlines	
Unit 1	**Introduction to Algae**
A	Algae: General characteristics
B	Broad Classification of algae
C	Economic importance of algae.
Unit 2	**Fungi**
A	General characteristics
B	Broad classification of fungi
C	Economic importance of Fungi
Unit 3	**Angiosperms**
A	Angiosperms: General characteristics
B	Monocots and dicots
C	Difference between monocot and dicot.
Unit 4	**Bryophytes**
A	Bryophytes: General characteristics
B	Reproduction in bryophtes
C	Economic importance of Bryophytes
Unit 5	**Pteridophytes**
A	Pteridophytes: General Characteristics
B	Classification of pteridophytes.
C	Economic importance of Pteridophytes,
Mode of examination	Theory

Weightage Distribution	CA	MTE	ETE
	30%	20%	50%

Text book/s*	• **Introductory Phycology**. Kumar,.D.(1999).Affiliated East-West. Press Pvt. Ltd. Delhi. 2 nd edition.

	• **Text book of Fungi & Their Allies**. Sethi, I.K. and Walia, S.K. (2011). MacMillan Publishers Pvt. Ltd., Delhi.
Other References	• **Biology**. Raven, P.H., Johnson, G.B., Losos, J.B., Singer, S.R., (2005). Tata McGraw Hill, Delhi, India. • **Introductory Phycology**. Kumar, H.D. (1999). Affiliated East-West. Press Pvt. Ltd. Delhi. 2 nd edition. • **Text book of Fungi & Their Allies**. Sethi, I.K. and Walia, S.K. (2011). MacMillan Publishers Pvt. Ltd., Delhi.

SEB 103: LANGUAGE ACROSS THE CURRICULUM

School: SOE	**Batch: 2020-24**
Program: B.Sc. B.Ed.	**Current Academic Year: 2020-21**
Branch: Education	**Semester: I**
Course Code	**SEB 103**
Course Title	**LANGUAGE ACROSS THE CURRICULUM**
Credits	3
Contact Hours (L-T-P)	3-0-0
Course Type	Core
Course Objectives	The course will enable the student-teachers to – 1. Develop interest in the theory and practice of a language across curriculum. 2. Build a perspective in the teaching of various subjects using a common language at the school level. 3. Guide the students to explore language in subject-specific contexts by relating it to the overall objectives of the curriculum. 4. Be acquainted with theoretical and practical aspects of all forms of languages
Course Outcomes	On the completion of this course, the pupil-teachers will be able to- **CO1:** To explain in details about the various important aspects of language; definition, mother language, multilingualism etc. **CO2**: Differentiate among various types of languages. **CO3**: Describe the language environment and expectations of the Indian school and home **CO4:** Analyze the right and wrong assumptions of language in schools

	CO5: Explain various important theories and practices of language acquisitions
	CO6: Evaluate the Language Processes in the context of Classroom environment
	CO7: Examine and analyze the challenges of language curriculum
	CO8: Apply the knowledge related with the various aspects of language and curriculum in teaching -learning environment
Course Description	The role of languages across the curriculum is being increasingly documented, it is important for all teachers to understand the importance of language across the curriculum and develop approaches that will help share the responsibility for the development of learners and the development of languages. We need to understand that language education is not confined to the language classroom. A science, social science or mathematics class is necessarily a language class also. Learning the subject means learning the terminology, understanding the concepts, and being able to discuss and write about them critically. Language is the medium for comprehending ideas, for reflection and thinking, as well as for expression and communication. Enhancing one's faculty in the language of instruction is thus a vital need of student-teachers, irrespective of the subject areas that they are going to teach. In India, language and literacy are generally seen as the concern of only the language teachers. However, no matter what the subject, teaching cannot take place in a language-free environment. This course is visualized to develop understanding about the nature and importance of classroom discourses; developing reading for information. This will strengthen the ability to 'read', 'think', 'discuss and communicate' as well as 'write' in the language of content. All possible efforts will be made to *build networks across different subjects and language* in order to enhance levels of language proficiency. Therefore, student-teachers will need to be familiar with theoretical issues and pedagogical issues of this course. The students will develop competence in analyzing current school practices and coming up with appropriate alternatives for language teaching and learning across school subjects.
Course Outlines	

Unit 1	**General Introduction on Language**
A	What is Language? various components of language; Functions of language; How different are different languages?
B	Critical analysis of the following terms: Dialect, Standard and Non-standard language, classical; Characterizing mother tongue, first language, and second language, bilinguals and multilingual.
C	Power, identity, and politics of language; Language as a medium of instruction and debates about English as a medium of instruction; The recommendations of NCF-2005 on language education
Unit 2	**Language and Literacy in the Context of School**
A	Language environment of school and the varied nature of Indian classrooms; Language Learner's profile: language environment at home; Characterizing bilingualism and multilingualism;
B	School's Expectations: Views relating to child's home language and literacy practices;
C	What is viewed as "right" and "wrong" language in schools and the underlying assumptions; Critically understanding "errors" and the insights they provide
Unit 3	**Language Acquisition**
A	Stages of Language learning in early childhood
B	Language and Cognition: Piaget, Vygotsky, And Chomsky on language acquisition and relevance of their views for the language teacher;
C	Second language acquisition processes
Unit 4	**Language Processes and the Classroom Context**
A	Oral language in the classrooms; Participation in the classroom; Facilitating language interaction and independence. Creating secure classroom environment for language use; Space for "risk taking";
B	Reading: Engaging with books of different types; Comprehension of stories and non-fiction (content area texts); Response to literature: Aesthetic and

	emotive aspect of reading.
C	Writing as a composing process: Problem solving, developing a sense of audience, purpose, and understanding the process of writing.
Unit 5	**Examining the language curriculum and challenges**
A	Use of literature in language textbooks, a critical analysis
B	Moving beyond the textbook: Children's literature for different age groups Classroom practices in India,
C	Examining the role of school context in creating difficulties for language learners
Mode of Examination	Theory/Jury/Practical/Viva

Weightage Distribution	CA	MTE	ETE
	30%	20%	50%

Text books*	- Agnihotri, R.K. & Khanna, A.L. (eds.) (1994). *Second language acquisition*. New Delhi:Sage Publications. - Agnihotri, R.K. (1999). Bachchon ki bhashaa seekhne ki kshamata, Bhag 1 or 2. *Shakshik Sandarbh*. Bhopal: Eklavya. - Agnihotri, R.K. (2007). *Hindi: An essential grammar.* London: Routledge - Agnihotri, R.K. (2007). *Towards a pedagogical paradigm rooted in multiliguality*. International Multilingual Research Journal, Vol. (2) 1-10 - Agnihotri, R.K. and Vandhopadhyay, P.K. (ed.) (2000). *Bhasha, bhubhashita or hindi: Ekanth samvaad,* New Delhi: Shilalekh - NCERT (2005). National Curriculum Framework (NCF). New Delhi: NCERT. - Reading Development Cell, NCERT (2008). *Reading for meaning.* New Delhi: NCERT. - Yule, G. (2006). *The study of language.* Delhi: Cambridge University Press. - Agnihotri, R.K. &Khanna, A.L. (eds.) (1994). *Second language*

	acquisition.NewDelhi:Sage Publications.
	• Agnihotri, R.K. (1999). Bachchonkibhashaaseekhnekikshamata, bhag 1 or2.*ShakshikSandarbh*. Bhopal: Eklavya.
	• Agnihotri, R.K. (2007). *Hindi: An essential grammar.* London: Routledge
	• Agnihotri, R.K. (2007). *Towards a pedagogical paradigm rooted in multiliguality*.InternationalMulilingual Research
Other References	• NCF (2009) NCTE, New Delhi.
	• Curriculum Framework 2014, NCTE New Delhi.
	• NCERT (2005). National Curriculum Framework (NCF). New Delhi: NCERT· Reading Development Cell, NCERT (2008). *Reading for meaning.* New Delhi:NCERT.
	• Rosenblatt, Louise M. (1980). What Fact Does This Poem Teach? Language Arts. 57(4).
	• Yule, G. (2006). *The study of language.* Delhi: Cambridge University Press

SEB 104: COMMUNICATION IN TEACHING-LEARNING PROCESS

School: SOE	**Batch: 2020-2024**
Program: B.Sc .B.Ed.	Current Academic Year: 2020-21
Branch: Education	Semester: I
Course Code	**SEB104**
Course Title	**Communication in Teaching-Learning Process**
Credits	**3**
Contact Hours (L-T-P)	**3-0-0**
Course Type	Co Requisite
Course Objectives	The course will enable the students- teachers to - 1. Develop the competencies of students to become effective communicators. 2. Acquaint the students with the factors responsible for shaping interaction in the classroom. 3. Familiarize the students with the language and ethics of communication in the classroom. 4. Develop the reading and writing skills of the students. 5. Familiarize the students with practices of Writing letters, applications Reports, journals and reflective diaries.
Course Outcomes	After the completion of the Course the student- teacher will be able to- CO1. Recognize the role of the teacher as Communicator CO2. Make relationship between Communication and curriculum; CO3. Comprehend Reading as Resource. CO4.Ideantify the importance of the writing skill in teaching learning process.

			CO5- Perform skill of Writing journals and reflective diaries etc.
Course Description			Communication in Teaching – Learning as viewed as a subject that aids in developing the student into effective communicators, who can efficiently and effectively articulate their thoughts, feelings and emotions. Communication is more than just pronunciation, intonation or articulation. Communication involves the teachers' classroom discourse and interaction that deepen thinking to help students internalize and process subject content. This course in Communication takes into account the context and purpose for which teachers and students are communicating. Given the emphasis on 21st century competencies, more demands are being made on the students to explain, justify and reason through problem-solving strategies. Teaching is not be seen as a one-sided activity, where in teacher is disseminating information, but two-way with teacher and/or students responding to each other to deepen content learning. The interaction among students as they co-construct knowledge becomes important too. The students play an active role in recognizing the role of language in meaning making, and see communication as a collaborative activity. Teachers and students co-construct knowledge together, particularly in the subjects that involve multimodal aspects of communication, for example, visual data such as graphs, charts, and statistics.
8		**Course Outlines**	
	Unit 1	**Teacher as Communicator**	
		A	Awareness of audience as a key factor in communication;
B			Children as learners;
C			Interpreting response in oral interaction
	Unit 2	**Communication and curriculum**	
A			Using knowledge about learner psychology as a factor in shaping classroom interaction;
B			Communication as a factor in Institutional Ethos;
C			Communication, language and ethics
	Unit 3	**Reading as Resource**	
	A		Reading as resource;
B			Choice of readings;
C			Analysing a text from the perspective of students
	Unit 4	**Writing Skills for Teachers**	
	A		Writing about research;
B			Writing annotations, References and bibliography;
C			Improving one's own language proficiency in oral and written modes: narrating, describing, analysing;
	Unit 5	**Writing Skills**	

	A		Writing letters, applications	
		B	Reports, minutes, and essays.	
		C	Writing journals and reflective diaries	

Mode of Examination	Theory/Jury/Practical/Viva			
Weightage Distribution	CA	MTE		ETE
	30%	20%		50%

References	• Grabe, W. & Stoller, F. (2013). Teaching and researching reading. New York, NY: Routledge.
	• Hacker, D. J., Dunlosky, J. & Graesser, A. C. (Eds.) (2009). Handbook of metacognition in education. New York, NY: Routledge.
	• Hartman, H. J. (Ed.) (2001). Metacognition in learning and instruction: Theory, research and practice. Dordrecht, The Netherlands: Kluwer Academic Publishers.
	• HKPISA Centre, The Chinese University of Hong Kong. (2015). The fifth HKPISA report, PISA 2012. Hong Kong: Author. McGregor, T. (2007). Comprehension connections: Bridges to strategic reading. Portsmouth, NH: Heinemann.
	• Rose, D. & Martin, J. (2012). Learning to write, reading to learn: Genre, knowledge and pedagogy in the Sydney school. Sheffield, United Kingdom: Equinox Publishing.
	• Rozmiarek, R. (2006). Improving reading skills across the content area. California: Corwin Press. Vacca, R. T., Vacca, J. A. L. & Mraz, M. E. (2005). Content area reading: Literacy and learning across the curriculum. Boston, MA: Pearson/Allyn and Bacon.
	• Wood, E., Woloshyn, V. E., & Willoughby, T. (1995). Cognitive strategy instruction for middle and high schools.

	Cambridge: Brookline Books.
Internet Resources	• EDB One-stop Portal for Learning & Teaching Resources http://www.hkedcity.net/edbosp/ • EDB: Reading to Learn http://www.edb.gov.hk/en/curriculum-development/4-key-tasks/reading-to-lear n/index.html • EDB: School Library Services http://www.edb.gov.hk/en/curriculum-development/resource-support/sch-lib-se rvices/index.html • OECD: Programme for International Student Assessment (PISA) http://www.pisa.oecd.org • Programme for International Student Assessment Hong Kong Centre: "Programme for International Student Assessment" http://www.fed.cuhk.edu.hk/~hkcisa/

Note-MOOCs Offered in First Semester-

1. ICT Skill based MOOCs -SWAYAM-Credits-4

2. MOOCs Chemistry -SWAYAM-Credits-3

BSP111 PHYSICS PRACTICAL

School: SOE	**Batch: 2020-24**
Program: B.Sc. B. Ed	**Current Academic Year: 2020-21**
Branch: Education	**Semester: I**
Course Code	**BSP111**
Course Title	**Physics Practical**
Credits	1
Contact Hours (L-T-P)	0-0-2
Course Status	Co Requisite
Course Objectives	1. To provide training in the broad methodology of science through investigatory type and open-ended laboratory exercises. 2. To develop an understating about the theoretical basis of the experiments. 3. To gain an understanding of different types of motions and their application. 4. To develop an understanding of moment and inertia. 5. To Develop a hands-on approach in understanding some of the theoretical principles of physics.
Course Outcomes	CO1. To apply the theoretical knowledge of simple harmonic motion and its conditions of one dimension in the lab experiments. PCO2. To validate the theoretical knowledge of Conservation of energy and momentum. PO3. To demonstrate the knowledge of modulus of rigidity of a material and moment of inertia by performing the Lab. Experiments about the same. PO4. To perform the experiments related to Harmonic motion. PO5. To apply the knowledge and skills in different fields/disciplines.
Course Description	This course helps the students to provide the training in the broad

	methodology of science through investigatory type and open-ended laboratory exercises.
Course Outlines	
Unit 1	**Practical related to motion**
A	• Study of the motion of an air bubble.
B	• Study of the motion of a freely falling body.
C	• Study of the acceleration of a body subjected to different unbalanced forces. • Study of accelerations of different masses under a constant unbalanced force.
Unit 2	**Practical related to Conservation of energy and momentum**
A	• Study of conservation of energy and momentum in head-on-collision between two spheres of equal mass.
B	• Study of conservation of momentum and energy of a collision in a plane
C	• Conservation of momentum in a mechanical explosion.
Unit 3	**Practical related to Harmonic motion**
A	• To study the relation between length and time period of a simple pendulum.
B	• Study of the variation of the time period of a bar pendulum with different length and determination of 'g' at the given place.
C	• To study the relation between force and extension produced in a stretched spring.
Unit 4	**Practical related to Harmonic motion**
A	• Study of the dependence of the period of oscillation of a spring-mass system on mass
B and C	• The Spiral spring: Determination of the acceleration due to gravity by

		the graphical method.
Unit 5		**Practical related to moment of inertia**
A		• Determination of moment of Inertia, mass and density of the flywheel.
B		• Moment of inertia of a disc supported on strings
C		• The moment of inertia of a wheel and axle. • The Bifilar Suspension

Mode of Examination	Practical		
Weightage Distribution	CA	MTE	ETE
	60%	0%	40%
Text books*			
Other References	• B.L.Flint & H.T.Worsnop, Advanced Practical Physics for students, Asia Publishing House, 1971. • E Armitage, Practical Physics, John Murray. • PSSC Physics Laboratory Guide. • S.Panigrahi & B. Mallick, Engineering Practical Physics, Cengage Learning India Pvt. Ltd., 2015 • Indu Prakash and Ramakrishna, A Text Book of Practical Physics, 11th Edition, Kitab Mahal, New Delhi, 2011. • Jerry D Wilson and Cecilia A. Hernández-Hall Physics Laboratory Experiments7th Edition, Cengage Learning, 2009. • S.Panigrahi & B.Mallick, Engineering Practical Physics, Cengage Learning India Pvt. Ltd., 2015. • Michael Nelson and Jon M. Ogborn, Advanced level Physics Practicals, 4th Edition,reprinted, Heinemann Educational Publishers, 1985.		

- Core Course 1C: Botany

BSP 112: CELL BIOLOGY LAB

School: SOE	Batch: 2020-2024
Program: B.Sc. B.Ed.	Current Academic Year: 2020-21
Branch: Education	Semester: I
Course Code	BSP112
Course Title	Cell Biology Lab
Credits	1
Contact Hours (L-T-P)	0-0-2
Course Status	Co Requisite
Course Objectives	1. To develop an understanding about the basic components of cell. 2. To introduce the mechanism of the transpiration by stomata. 3. To understand the movement across the cell membrane. 4. To develop the knowledge about different phases of growth cycle and cell division. 5. To study the theoretical foundation and concepts of Biology.
Course Outcomes	After finishing the course, the students will be able to CO1: To describe the basic components of prokaryotic and eukaryotic cell. CO2: To explain the structure and purpose of basic components of prokaryotic and eukaryotic cells, especially macromolecules, membrane and organelles. CO3: To discuss the transpiration by stomata. CO4: To identify movement across the cell membrane.

	CO5: To categories different phases of growth cycle and cell division. CO6: To compare between mitosis and meiosis.
Course Description	This Course Introduces the basics of cell biology and the structure and function of the cell.
Outline syllabus	
Unit 1	**Practical based on Cell observation**
	Sub unit – a,b.c
Unit 2	**Practical related to cell and cell organelle**
	Sub unit –c
Unit 3	**Practical based to Transportation**
	Sub unit – a
Unit 4	**Practical based upon Nucleus and Chromosomes**
	Sub unit – c
Unit 5	**Practical related to Cytoskeleton and Cell to cell interaction**
	Sub unit - a
Mode of Examination	Practical/Viva

Weightage Distribution	CA	MTE	ETE
	60%	0%	40%

LIST OF PRACTICAL 'S:

Week 1	**Unit 1**	**Practical based on Cell and Cell Theory**	
Week 1-2	a	Lab expt.1	To Prepare a Stained Temporary Mount of Onion Peel.
Week 3		Lab expt.2	To Prepare a stained Temporary Mount of Human Cheek Cells
	Unit 2	**Practical related to study different types of cell**	
Week 4	b	Lab expt.4	To observe Bacterial cell
		Lab expt.5	To prepare a thin blood smear and visualize and identify the

			different blood cell types in human blood.
	Unit 3	**Practical based upon Bacterial cell and cell division**	
Week 5	a	Lab expt.5	To study mitosis in onion root tip.
Week 6	b	Lab expt.6	To study miosis
Week 7	Mid term		
	Unit 4	**Practical based upon study movement**	
Week 8	a	Lab exp 7	Preparation of temporary of leaf epidermis to visualize stomata and study the structure of stomatal apparatus.
Week 9-10	b	Lab exp 8	Demonstration of Osmosis
	Unit 5	**Practical related**	
Week 11-14	a, b and c	Lab expt 9	To isolate and observe filamentous soil fungi using dilution and plating techniques.

BSP 113: CHEMISTRY PRACTICAL

School: SOE	**Batch: 2020-24**
Program: B.Sc. B.Ed.	**Current Academic Year: 2020-21**
Branch: Education	**Semester:** I
Course Code	**BSP:113**
Course Title	**Chemistry Practical**
Credits	1
Contact Hours (L-T-P)	0-0-2
Course Status	Co Requisite
Course Objectives	1. To develop the concept of good lab practices including safety and glassware's handling, chemicals handling, chemical/glassware waste management, error analysis, notebook maintenance.
	2. To develop an understanding of titration and techniques of titration.
	3. To gain the theoretical knowledge of trituration and oxidation in Lab. Experiments.
	4. To strengthen the concepts of mole and stoichiometry.
	5. To develop analytical skills of volumetric technique.
Course Outcomes	After the completion of this course, the students will be able to
	CO1: Calibrate the given volumetric flask, pipette, burette, and
	demonstrate the basic laboratory technique of titration and prepare some standard solutions of acids & bases.
	CO2: Estimate the amount of acid and base present in a mixture using reverse titration and double indicator method.
	CO3: Demonstrate the acid base titration by using different indicators
	CO4: Demonstrate the oxidation-reduction titrations and use it to standardize the given solutions.
	CO5: recognize the need of standardization of a chemical solution.
Course Description	This course discusses the handling and calibration of balances and lab apparatus required to carry out titrimetric analysis. Also, the course gives a practical knowledge of standardization of chemical solutions in the laboratory.
Course Outlines	
Unit 1	
A	Calibration and handling of balances, pipette, burette, and standard flask. Basic principles underlying the preparation of solutions.
	Stoichiometry of neutralization reactions of Sulphuric, Hydrochloric and Nitric acid using sodium hydroxide solution.

	Preparation of standard Sodium Carbonate solution and Standardization of Hydrochloric acid via volumetric titration.
Unit 2	
A	Estimation of Carbonate and Bicarbonate in a given mixture by double indicator method.
	Estimation of carbonate and hydroxide present in a mixture
	Estimation of ammonium chloride in a given solution by back titration
Unit 3	
A	Estimation of oxalic acid present in the given solution using sodium hydroxide solution and pure crystals of potassium hydrogen phthalate.
	Estimation of Ferrous ammonium sulphate present in the given solution using potassium permanganate solution and pure crystals of oxalic acid.
Unit 4	
A	Estimation of iron (II) using Potassium dichromate with internal and external indicators
	Estimation of ferrous and ferric ions in a given mixture using potassium dichromate solution.
Unit 5	
A	Standardization of Sodium thiosulphate using potassium dichromate and
	Estimation of copper by Iodometry.
	Estimation of total hardness of water using EDTA solution and pure crystals of Zinc sulphate.

Mode of Examination	Jury+ Practical+ Viva		
Weightage Distribution	CA	MTE	ETE
	60%	0%	40%
Text books*	A Text Book of Quantitative Inorganic Analysis, A I Vogel		
Other References	Systematic Experiments in Chemistry Arun Sethi New Age International (p) Ltd. Cochin.		

SHARDA UNIVERSITY
Beyond Boundaries

BSP114: BIOMOLECULES LAB

School: SOE	Batch: 2020-2024
Program: B.Sc.B.Ed	Current Academic Year: 2020-21
Branch: Education	Semester: I
Course Code	BSP114
Course Title	Biomolecules Lab
Credits	1
Contact Hours (L-T-P)	0-0-2
Course Status	Co Requisite
Course Objective	1. To study the principle of working of spectrophotometer. 2. To develop knowledge on the methodology for estimation of proteins 3. To study the purification and estimation of nucleic acids. 4. To develop the concept of the purification and estimation of milk components. 5. To study the working of enzymes on their respective substrate 6. To strengthen the concepts the basic concept Biochemistry
Course Outcomes	After finishing the course, the students will be able to CO1: To describe the principle of working of spectrophotometer. CO2: To discuss the methodology for estimation of proteins CO3: To determine the purification and estimation of nucleic acids and milk components. CO4: To analyses the working of enzymes on their respective substrate CO5: To describe the basic concept Biochemistry.
Course Description	This course talks about the basics of Biomolecules.
Outline syllabus	
Unit 1	Determination of Absorption Maxima
	Verification of Beer Lambert's Law
	Preparation of Standard Curve
Unit 2	Estimation of Protein by Biuret Method
	Estimation of Protein by Lowry Method
Unit 3	Purification and estimation of DNA from plants

	Purification and estimation of DNA from bacteria
Unit 4	Purification & Estimation of Casein in milk.
	Estimation of cholesterol
Unit 5	Mode of action of α-amylase on starch
	Estimation of Enzyme activity
Mode of examination	Practical/Viva

Weightage Distribution	CA	MTE	ETE
	60%	0%	40%

Text book/s*	Practical Manual of Biotechnology, by Ritu Mahajan, Jitender Sharma, RK Mahajan

SEMESTER -II

BSI 112: ELASTICITY, WAVES, HEAT, AND THERMODYNAMICS

School: SOE	Batch: 2020-24
Program: B.Sc. B.Ed.	Current Academic Year: 2020-21
Branch: Education	Semester: II
Course Code	BSI 112
Course Title	Elasticity, Waves, Heat, And Thermodynamics
Credits	4
Contact Hours (L-T-P)	4L+ 0T +0P
Course Status	Core
Course Objectives	1. Develop an understanding of principles of elasticity and apply principles of the same in different situations. 2. Gain understanding about waves, their types and the propagation. 3. Apply the principles of heat, thermodynamics and classical statistical mechanics to explain natural physical phenomena. 4. Students to identify and modify alternative conceptions in the domains of elasticity, waves, heat. 5. Develop a theoretical perspective thermodynamics and classical statistical mechanics.
Course Outcomes	After the completion of this course, the student will be able to CO1: Use of moment of force and properties of matter to describe the elasticity. CO2: Explain modulus of rigidity of a material and moment of inertia also. CO3: Examine the phenomenon of interference in sound and light waves. CO4: Illustrate the concept of spherical and plane wave propagation. CO5: Discriminate the transverse and longitudinal waves. CO6: Understand the importance of First law of thermodynamics. CO7: Appreciate second law of thermodynamics and understand the

	thermodynamics of engines.
	CO8: Know the concept of entropy and second law of thermodynamics.
	CO9: Appreciate the laws of thermodynamics and will understand how the things behave thermodynamically.
	CO10: Apply thermodynamic principle on various practical and research problems.
Course Description	This course is designed to teach students the basic laws of thermodynamics, thermodynamic potentials. They also learn about certain properties of matter like elasticity. It also provides introduction to theoretical basis of wave related phenomenon and its applications.

Course Outlines

Unit 1	**ELASTICITY**
A	• Elasticity: Hooke's law - Stress-strain diagram - Elastic moduli- Dependence of Young's modulus on temperature and its applications.
B	• Relation between elastic constants – Poisson's Ratio-Expression for Poisson's ratio in terms of elastic constants - Elastic potential Energy.
C	• Determination of Rigidity modulus by static torsion - Torsional Pendulum- Determination of rigidity modulus and moment of inertia by Searle's method.
Unit 2	**WAVES**
A	• Review of Mechanical waves, types of waves, travelling waves, the superposition principle, wave speed.
B	• Transverse waves on a string- travelling and standing waves on a string. Normal Modes of a string. Group velocity, Phase velocity.
C	• Plane waves. Spherical waves, interference of waves, standing waves, resonance, Doppler effect.
Unit 3	**THERMODYNAMICS –I**
A	• Zeroth Law of thermodynamics and temperature. First law and internal energy, conversion of heat into work, Various Thermodynamically Processes, Applications of First Law
B	• General Relation between C_P & C_V, Work Done during Isothermal and Adiabatic Processes,
C	• Compressibility & Expansion Coefficient. Reversible & irreversible processes,
Unit 4	**THERMODYNAMICS –II**

A	• Second law & Entropy, Carnot's cycle & theorem
B	• Entropy changes in reversible & irreversible processes, Entropy-temperature diagrams.
C	• Entropy changes in reversible & irreversible processes, Entropy-temperature diagrams;
Unit 5	**THERMODYNAMICS –III**
A	• Third law of thermodynamics, Un attainability of absolute zero. Thermodynamic potentials.
B	• Enthalpy, Gibbs, Helmholtz and Internal Energy functions, Maxwell's relations & applications
C	• Joule-Thompson Effect, Expression for (CP-CV). • Clausius-Clapeyron Equation, TdS equations
Mode of Examination	Theory

Weightage Distribution	CA	MTE	ETE
	30%	20%	50%

Text books*	1. D. S. Mathur, Heat and Thermodynamics, Sultan Chand. 2. M. N. Saha and B. N. Srivastava, Treatise on Heat, The Indian Press. 3. A. Kumar and S.P. Taneja, Thermal Physics, R. Chand Publications, 2014.
Other References	1. David Halliday, Robert Resnick and Jay Walker, Fundamentals of Physics, 6th Edition, John Wiley and Sons, Inc. 2. Harris Benson, University Physics, Revised Edition, John Wiley and Sons Inc. 3. Zeemansky and R. Dittman, Heat and Thermodynamics, McGraw Hill, 7th edition,1996 4. H J Pain, Physics of Vibration and Waves, Wiley; Sixth edition, 2006. 5. Brijlal and Subramaniam, Heat and Thermodynamics, S Chand, 2008. 6. Matveev, Thermal Physics, MIR Publications 7. D S Mathur, Elements of Properties of Matter, S.Chand (G/L) & Company Ltd.,

	2010.
	8. A. B. Gupta and H. Ray, Heat and Thermodynamics, New central publications.

BSI 113: BIOANALYTICAL TECHNIQUES

School: SOE	Batch: 2020-2024
Program: B.Sc. B.Ed.	Current Academic Year: 2020-2021
Branch: Education	Semester: II

1	Course Code	BSI 113
2	Course Title	**Bioanalytical Techniques**
3	Credits	4
4	Contact Hours (L-T-P)	4-0-0
	Course Status	Core
5	Course Objective	1. To give students a thorough understanding of tools and techniques in Bio analytics. 2. To make students learn the working and operation of various biotechnological instruments. 3. To enable the students to understand the process of Separation of pigments, drugs, amino acids and hormones using chromatographic techniques. 4. To develop their skills in Separating and visualizing nucleic acids and proteins using gel electrophoresis. 5. Operation and working of different instruments and bioanalytical techniques.
6	Course Outcomes	**CO1**: Operate autoclave, Laminar Air flow and Hot air oven and sterilize glass and plasticwares. **CO2**: Handling the Microscope for the purpose of examination of slide **CO3**: Separate and visualize nucleic acids and proteins using gel electrophoresis. CO4: Operate spectrophotometer and perform absorbance assays. CO5: Separation of pigments, drugs, amino acids and hormones using chromatographic techniques.

		CO6: Operation and working of different instruments and bioanalytical techniques
7	Course Description	This course is designed to make students learn about various instruments and techniques of biomedical and biotechnology laboratory and will also enable them to use and apply these techniques and equipment's to solve experimental problems.
8	**Course Outlines**	
	Unit 1	**Preparations of Solution, Buffers, Cell lysis and extraction methods (5L)**
	A	Preparation of solutions, polar, nonpolar, molar and normal solutions, ppm solutions.
	B	Mass Fraction, Solution by Serial Dilutions, Percentage Solutions, Preparation of Standard Solution of Acids and Bases,
	C	Buffer System, various types of buffers
	Unit 2	
	A	Principle and working: Cell lysis (Mechanical, Chemical, enzymatic),
	B	methods of extraction: Solid-liquid, liquid-liquid; macerations,
	C	conventional and non-conventional type of extraction methods
	Unit 3	**Imaging and Mass spectrometry (5L)**
	A	Principles and working: Microscopy Dark-field, Phase contrast, Fluorescence, Confocal, Polarization microscopy
	B	Mass spectrometric techniques: Ionization, Mass analysers, Detectors, Structural information by tandem mass spectrometry
	C	Analysing protein complexes
	Unit 4	**Spectroscopy (8L)**
	A	Principles and working: Spectroscopy, UV-VIS spectrophotometer
	B	Fundamentals of Infrared and Raman spectroscopy
	C	Atomic spectroscopy and Circular dichroism spectroscopy
	Unit 5	**Advance techniques in biochemistry and molecular biology (8L**
	A	Chromatography: High Performance Thin Layer Chromatography (HPTLC) High Pressure Liquid Chromatography (HPLC)

	B	Gas Chromatography, Mass spectroscopy
	C	Atomic absorption and flame emission spectroscopy
	Mode of Exam	Theory
	Weightage Distributio n	CA	MTE	ETE
		30%	20%	50%
	Text book/s*	Wilson K. and Walker J., "Principles and Techniques of Biochemistry and Molecular Biology", Cambridge Press, 2010.
•	**Other Refere nces**	• Cottenil R.M.S., "Biophysics: An Introduction", John Wiley and Sons, 2002. • Gupta A., "Instrumentation and Bioanalytical Techniques", PragatiPrakashan, 2009. • 3.Principles of Biochemistry, Latest Edition, A.L. Lehninger, D.L. Nelson, M.M. Cox., Worth Publishing • 4.Biochemistry by Mathews, Van Holde • 5.Textbook of Biochemistry by Metzler • 4.Biological Instrumentation and Methodology Dr. PK Bajpai • 5.The Tools of Biochemistry by Cooper • 6.Practical biochemistry by Wilson and Walker

BSI 114: CALCULUS II -ANALYTICAL GEOMETRY AND NUMBER THEORY

School: SOE		Batch: 2020-24
Program: B.Sc. B. Ed.		Current Academic Year: 2020-21
Branch: Education		Semester: II
1	Course Code	BSI 114
2	Course Title	Calculus II -Analytical Geometry and Number Theory
3	Credits	5
4	Contact Hours (L-T-P)	4-1-0
	Course Status	Core
5	Course Objectives	1. understand the concepts of number system. 2. Develop a basic understanding of analytical geometry and principles. 3. Apply techniques of calculus of several variables in problem Solving. 4. Develop an understanding of Congruences linear congruences. Simultaneous. 5. Develop. a basic idea of Analytic geometry.
6	Course Outcomes	After completing the course, the student will be able to PO1.Compute and solve the problems based on Partial derivates, Analytical geometry. PO2.Develop an understanding of Theory of Numbers and solve the problems based on the theory CO3.Establish the relationship between the Cartesian coordinates and position vector. CO4.Solve problems based on theoretical understanding of important ideas in this course. CO5.Differentiate between Congruences, linear congruences. Simultaneous.
7	Course Description	This Course will help the students to develop the understanding of analytical geometry, principles, techniques of calculus, Congruences linear congruences and Theory of Numbers.

8	Course Outlines	
	Unit 1	**Partial Derivatives. I**
	A	Functions of two or more variables, Limits, Continuity, Partial derivatives, Differentiable Functions.
	B	Homogeneous functions, Euler's theorem, Chain Rule.
	C	Change of Variable, Partial Derivatives of higher order, Taylor's Theorem, Derivative of Implicit functions, Jacobians.
	Unit 2	**Analytical Geometry. I**
	A	Cartesian coordinates in three dimensional spaces, Relation between Cartesian coordinates and position vector.
	B	Distance formula (Cartesian and Vector form), Direction cosines, Direction ratios, Projection on a Straight line, angle between two lines,
	C	Area of Triangle, Volume of a tetrahedron. Straight line, equations of straight lines (Cartesian and Vector form).
	Unit 3	**Analytical Geometry. II**
	A	Planes, Equations of Planes (Cartesian and Vector form), Normal form, Angle between planes, Coaxial planes, Parallel and Perpendicular planes, Length of a Perpendicular from a point to a plane.
	B	Bisectors of angles between two planes, shortest distance between two skew lines. Bisectors of angles between two planes, shortest distance between two skew lines.
	C	Translation and Rotation of Cartesian axes in plane, Curves of second degree, Discriminant
	Unit 4	**Theory of Numbers**

	A	Division Algorithm. Prime and Composite Numbers. proving the existence and uniqueness
	B	of GCD and the Euclidean Algorithm.
	C	Fundamental theorem of Arithmetic - the least common multiple
Unit 5		
	A	Congruences. linear congruences. Simultaneous
	B	Wilson's theorem.
	C	Congruences. Theorem of Euler. Fermat and Lagrange.
Mode of Examination		

Weightage Distribution	CA	MTE	ETE
	30%	20%	50%

Text books*	A Text Book of Qualitative organic Analysis, A . I . Vogel
Other References	- Calculus by Anton,Wiley. - Calculus with Analytic Geometry by S K Stein, McGraw Hill. - Calculus and Analytical Geometry by Thomas and Finney, S.Chand and Co. Ltd. - First Course in Calculus by Serge Lang, Addison-Wiley. - Calculus, Vols. 1 and 2 by Lipman Bers, IBH. - Introduction to Calculus and Analytical Geometry by Courant and John, Narosa Publishing House. - Advanced Calculus by Frank Ayres, Schaum Publishing Co. - Algebra by Bamard and Child, Macmillan India Ltd. - Integral Calculus by Shanthinarayan, S.Chand and Co. Ltd. - Differential Calculus by Gorakhprasad, Pothishala Ltd.

		- A Course in calculus and Real Analysis-IbyGhorpade S R and Limaye B V (2006), Springer Verlag
		- Elementary Number Theory by David M. Burton.
		- Elementary Number Theory with applications (2nd edition) by Thomas Koshy, Academic Press.

BSI 115: MICROBIOLOGY

School: SOE	**Batch :2020-2024**	
Program: B.Sc B.Ed	**Current Academic Year: 2020-2021**	
Branch: Education	**Semester: II**	
1	**Course Code**	**BSI 115**
2	**Course Title**	**Microbiology**
3	**Credits**	4
4	**Contact Hours (L-T-P)**	4-0-0
	Course Status	Core
5	**Course Objectives**	1. This course has been designed to make students understand the basic characteristics of microbes. 2. To know about basis principle and to understand the methods of sterilization 3. Students understand the basic structure of Bacteria
6	**Course Outcomes**	After successfully completion of this course students will be able to: CO1: To study the history of microbiology and its basic concepts. Structure and nutrition of bacteria CO2: Growth, multiplication, factors affecting growth of bacteria and techniques related to its isolation CO3: Principles of physical and chemical methods used in the control of microorganisms CO4: Prevention and control of microbial disease CO5: Application of microorganisms in different industries that can benefit human
7	**Course Description**	Microbiology course outlines the general characteristics of different microorganisms and also provides the basic knowledge of significance of different microbes affecting the human beings.
8	**Course Outlines**	
	Unit 1	**Introduction to Microbiology**

A	History of Microbiology & contribution of microbiologists	
B	Spontaneous generation; Koch Postulates	
C	Whittaker's 5 kingdom concept; Pasteurization.	
Unit 2	Morphology and Nutrition of Bacteria	
A	Morphology and fine structure of Bacteria; outer surface of bacteria; Cell wall of Gram +ve and Gram –ve bacteria	
B	Nutritional classification of Bacteria	
C	Brief overview on Archaea; Cyanobacteria, PPLO	
Unit 3	**Growth and Sporulation in Bacteria**	
A	Modes of cell division (Binary fission; budding and Septum formation); Normal growth of bacteria; Growth curve	
B	Pure culture, Method of isolating pure culture (Streak method, Pour-plate and spread plate technique); Synchronous and asynchronous	
C	Growth inhibitory substances (temperature, acidity, alkalinity, water availability, oxygen)	
Unit 4	**Microbes**	
A	Concept and classification of microbes	
B	Benefit and harms of microbes	
C	Microbes and Human welfare (medical and chemical industry)	
Unit 5	**Control of Microbial Growth**	
A	Microbes in food industry	
B	Physical methods of control of microorganisms	
C	Chemical methods of control of microorganisms	
Mode of Examination	Theory	
Weightage	CA	MTE	ETE

Distribution	30%	20%	50%
Textbook/s*	*Microbiology - Pelezar***,** M.J. Reid, R.D. and E.C.S. Chan, Tata McGraw Hill, New Delhi.1977 (4th Edition)		
Other References	1. *Prescott*, *Harley* and *Kelvin* – *Microbiology*, 2nd ed. TMH Publication 2. General Microbiology: Roger & Strainer et.al. PHL Publication		

BSI 116: STATES OF MATTER AND NUCLEAR CHEMISTRY

School: SOE	Batch: 2020-24
Program: B.Sc. B.Ed.	Current Academic Year: 2020-21
Branch: Education	Semester: II

1	Course Code	BSI 116
2	Course Title	States of Matter and Nuclear Chemistry
3	Credits	4
4	Contact Hours (L-T-P)	4L+ 0T +0P
	Course Status	Core
5	Course Objectives	1. Illustrate how a scientific model can be constructed based on the experimental observations of the behaviour of gases and to explain the properties in terms of microscopic organization. 2. To understand the shapes of molecules in terms of symmetries and to relate the properties of matter in solid state to the structure. 3. To develop an understanding of properties of Gases, Liquids, colloids and Solutions. 4. To develop an understanding of the concept of acids and bases, characteristics of nonaqueous solvents. 5. To familiarize radioactivity as a nuclear phenomenon in understanding the nuclear reactions
6	Course Outcomes	After the completion of this course, the student will be able to **CO1**: explain the gas theories, PV isotherms, calculate and interpret molecular velocities. **CO2**: understand the shapes of molecules in terms of symmetries, predict the crystal structure and to relate the properties of matter in solid state to the structure. **CO3**: understandproperties of Gases, Liquids, colloids and Solutions, emulsions and gel. **CO4**: understand and explain the concept of acids and bases, characteristics of nonaqueous solvents. **CO5**: develop an understanding of nuclear particles and explain the

		phenomena of radioactivity and its application
7	**Course Description**	This course discusses the various states of matter (soli, liquid, gas), their nature and fundamental of nuclear chemistry, describe various types of acid base reactions and understand their applications.
8	**Course Outlines**	
	Unit 1	**GASEOUS AND SOLID STATE**
	A	• Review of kinetic theory of gases. Postulates of kinetic theory of gases, deviation of real gas from ideal behaviour, van der Waals equation of state. Compressibility factor. Critical Phenomena: P-V isotherms of real gases, continuity of states, the isotherms of van der Waals equation,
	B	• Derive a relationship of critical constant, Boyle's temperature and inversion temperature
	C	• Molecular Velocities: Root mean square, average and most probable velocities. Maxwell distribution of molecular velocities mean free path and collision diameter. Liquefaction of gases (based on Joule-Thomson effect).
	Unit 2	**SOLID STATE**
	A	• Explanation of the macroscopic properties of solids in terms of structure, bonding and defects. Definition of space lattice, unit cell.
	B	• Laws of crystallography. (i) Law of constancy of interfacial angles, (ii) Law of rationality of indices, (iii) Law of symmetry. Symmetry elements in crystals.
	C	• X-ray diffraction by crystals. Derivation of Bragg equation. Predicting crystal structure. Defects in solids.
	Unit 3	**LIQUIDS AND COLLOIDS**
	A	• Formation of liquid crystal, characteristic, properties and its type. Characteristics and structure of lyotropic and thermotropic liquid crystal.
	B	• Definition of colloids, classification of colloids. Solids in liquids (sols): Properties. kinetic, optical and electrical; stability of colloids, protective

		action, Hardy Schulze law, gold number.
	C	• Liquids in liquids (emulsions): Types of emulsions, preparation. Emulsifier. Liquids in Solids (gels): Classification, preparation and properties, inhibition, general applications of colloids.
	Unit 4	**ACIDS AND BASES**
	A	• A discussion on changing concepts of acids and bases involving concentrations and effects of solvent medium. Arrhenius, Bronsted-Lowry and Lewis concepts of acids and bases. Effect of electronegativity, Inductive effect, resonating effect on organic acid and bases.
	B	• Hard and Soft Acids and Bases (HSAB) -Classification of acids and bases as hard and soft.
	C	• Non-aqueous Solvents- Physical properties of a solvent, types of solvents and their general characteristics, reactions in non-aqueous solvents with reference to liquid NH_3 and liquid SO_2.
	Unit 5	**NUCLEAR CHEMISTRY**
	A	• Fundamental particles of nucleus, Concept of Nuclides, isotopes, isobars and isotones (with specific examples), nuclear forces, qualitative idea of stability of the nucleus (n/p ratio), binding energy,
	B	• Natural and artificial radioactivity, Radioactive Disintegration series, half-life, average life, nuclear reactions, artificial transmutation, nuclear fusion and fission. Nuclear fusion as a future source of energy, nuclear reactors,
	C	• Application of Radioactivity and Radio isotopes as tracers in chemistry, biology, medicine, agriculture and industry. Isotope dilution analysis, Neutron activation analysis.
	Mode of Examination	Theory

	Weightage Distribution	CA	MTE	ETE
		30%	20%	50%

Text books*	•
Other References	• Essentials of Physical Chemistry Arun Bahl B.S.Bahl, G.D.Tuli, S.Chand & Company Ltd. • Principles of Physical Chemistry: Marron and Prutton • Elements of Physical Chemistry: Samuel Glasstone and Lewis • Physical Chemistry: P W Atkins • Nuclear Chemistry V.N.Darls Sultan Chand & sons. • 6. Essentials of Nuclear Chemistry Arnikar, Hari Jeevan, 4th edition, New Age International

SHARDA UNIVERSITY
Beyond Boundaries

BSI 117: ENERGY HARVESTING AND CONSERVATION

School: SOE	Batch: 2020-24
Program: B.Ed. B. Ed.	Current Academic Year: 2020-21
Branch: Education	Semester: II

1	Course Code	BSI 117
2	Course Title	**Energy Harvesting and Conservation**
3	Credits	3
4	Contact Hours (L-T-P)	3-0-0
	Course Status	DSE
5	Course Objectives	1. To create awareness about sources of energy and able to estimate how long the available conventional fuel reserves will last. 2. Explain the concept of various forms of renewable energy 3. Learn the present energy scenario and the need for energy conservation 4. Analyse the environmental aspects of renewable energy resources.
6	Course Outcomes	After the completion of this course, the students will be able to- CO1: Understand the need, importance and scope of non-conventional and alternate energy resources. CO2: Describe the use of solar energy and the various components used in the energy production with respect to applications like - heating, cooling, desalination, power generation, drying, cooking etc. CO3: Gain knowledge about working principle of various solar energy systems CO4: Appreciate the need of Wind and ocean Energy and the various components used in energy generation and know the classifications CO5: Understand and appreciate the uses of ocean energy.
7	Course Description	The aim of this course is to impart theoretical knowledge about available energy resources and their conservation along with exposure and hands-on learning wherever possible. It intends to impart the science behind the

			renewable energy types and technologies for its harvesting.
8			
	Unit 1		**Fossil fuels and Alternate Sources of Energy**
		A	• Fossil fuels and nuclear energy, their limitation
		B	• Need of renewable energy, Classification of Energy Resources- Conventional Energy Resources, Non-Conventional Energy Resources
		C	• An overview of developments in Offshore Wind Energy, Ocean Thermal Energy Conversion, solar energy
	Unit 2		**Solar Energy-1**
		A	• Solar energy, its importance
		B	• Measurement of Solar Radiation on horizontal and tilted surfaces
		C	• Storage of solar energy, solar pond, non- plate collector, solar distillation, solar cooker, solar green houses, solar cell, absorption air conditioning
	Unit 3		**Solar Energy-2**
		A	• Solar Photovoltaic, Solar Cell fundamentals, Characteristics, Classification
		B	• Need, characteristics and applications of photovoltaic (PV) systems,
		C	• PV models and equivalent circuits, and sun tracking systems.
	Unit 4		**Wind Energy harvesting**
		A	• Introduction, History of Wind Energy, Wind Energy Scenario of World and India.
		B	• Wind Turbines and different electrical machines in wind turbines
		C	• Power electronic interfaces, and grid interconnection topologies.

Unit 5	Ocean Energy
A	• Ocean Energy Potential against Wind and Solar energy, Wave Characteristics and Statistics
B	• Wave Energy Devices, Ocean Thermal Energy
C	• Tide characteristics, Tide Energy Technologies and Ocean Bio-mass.

Mode of Examination	Theory		
Weightage Distribution	CA	MTE	ETE
	30%	20%	50%

Text books*	•

• Other References	• Non-conventional energy sources - G.D Rai - Khanna Publishers, New Delhi • Solar energy - M P Agarwal - S Chand and Co. Ltd. • Solar energy - Suhas P. Sukhative Tata McGraw - Hill Publishing Company Ltd. • Godfrey Boyle, "Renewable Energy, Power for a sustainable future", 2004, Oxford University Press, in association with The Open University. • Dr. P. Jayakumar, Solar Energy: Resource Assessment Handbook, 2009 • J. Balfour, M. Shaw and S. Jarosek, Photovoltaics, Lawrence J. Goodrich (USA).

BSI118: NUCLEAR AND PARTICLE PHYSICS

	School: SOE		Batch: 2020-24
	Program: B.Sc. B.Ed.		Current Academic Year: 2020-21
	Branch: Education		Semester: II
1	Course Code		BSI118
2	Course Title		**NUCLEAR AND PARTICLE PHYSICS**
3	Credits		3
4	Contact Hours (L-T-P)		3L+ 0T +0P
	Course Status		DSE
5	Course Objectives		To introduce the concepts and methods in nuclear and particle Physics
6	Course Outcomes		After the completion of this course, the student will be able to CO1: explain external and internal properties of the atomic nucleus. CO2: describe basic models of the atomic nucleus. CO3: explain the different forms of radioactivity and account for their occurrence CO4: master relativistic kinematics for computations of the outcome of various reactions and decay processes CO5: describe the astrophysical processes leading to nuclear synthesis account for the fission and fusion processes CO6: state radiation detectors and accelerators and classify elementary particles according to their quantum numbers and draw simple reaction diagrams
7	Course Description		The course gives an overview of modern nuclear and particle physics, stressing fundamental concepts and processes, methods of measurement and applications within other sciences and technology.
8	Course Outlines		
	Unit 1		**ATOMIC NUCLEUS**
	A		• Nuclear structure, Failure of proton-electron hypothesis– neutron, its discovery and properties, Proton-neutron hypothesis, Constituents of nucleus and their Intrinsic properties, Basic properties of nucleus– charge, spin, radii, mass, magnetic moment. Nuclear forces and their

		characteristics, Yukawa's Theory (Qualitative)
	B and C	• Packing fraction and binding energy, average binding energy and its variation with mass number, main features of binding energy versus mass number curve, nuclear stability, Segre chart.
Unit 2		**NUCLEAR MODELS**
	A	• Nuclear Models– Liquid drop model approach, semi empirical mass formula and significance of various terms, condition of nuclear stability. Two nucleon separation energies,
	B	• Fermi gas model (degenerate fermion gas, nuclear symmetry potential in Fermi gas),
	C	• evidence for nuclear shell structure, nuclear magic numbers, basic assumption of shell model
Unit 3		**RADIOACTIVITY**
	A	• Review: Radioactive decay – Half life, mean life, Activity-decay constant. Radioactive displacement laws. Theory of a decay, α-emission, Gamow factor. Geiger-Nuttal law. Beta decay, energy kinematics for Beta decay, positron emission Beta spectra. Neutrino hypothesis, K electron capture, internal conversion,
	B and C	• Gamma decay, pair production, successive disintegration, units of radio activity, radioactive dating
Unit 4		**NUCLEAR ENERGY**
	A, B and C	• uncontrolled and controlled chain, reactions, nuclear fission and fusion. Energy liberated in nuclear fission, energy production in stars, Nuclear reactors.
Unit 5		**PARTICLE PHYSICS**
	A	• Particle Accelerators and Detectors: Cockcroft– Walton voltage multiplier, LINAC, Cyclotron, Betatron.
	B	• Nuclear Detectors: GM counter, scintillation detector, bubble chamber, principle of semi-conductor detector.
	C	• Particle Physics: Particles and anti-particles, Classification of particles, Symmetries and Conservation Laws, Qualitative introduction to quarks, Structure of hadrons.

Mode of Examination	Theory		
Weightage Distribution	CA	MTE	ETE
	30%	20%	50%
Text books*	Subramanyam and Brijlal, Atomic and Nuclear Physics, S. Chand & Company Ltd. 2013.		
Other References	I. Kaplan, Nuclear Physics, Narosa, 2002. - Kenneth S. Krane, Introductory nuclear Physics, Wiley India Pvt. Ltd., 2008. - Bernard L. Cohen, Concepts of nuclear physics, Tata McGraw Hill, 1998. - R.A. Dunlap, Introduction to the physics of nuclei & particles, Thomson Asia, 2004. - Arthur Beiser, Perspectives of Modern Physics, McGraw-Hill Inc.,US; International edition. 6. D. Griffith, Introduction to Elementary Particles, John Wiley & Sons, 2008.		

SEB102: BASIC PHILOSOPHICAL AND SOCIOLOGICAL CONCEPTS IN EDUCATION

School: SOE	Batch: 2020—2024
Program: B.Sc. B.Ed.	Current Academic Year: 2020-21
Branch: Education	Semester: II

1	Course Code	SEB102
2	Course Title	Basic Philosophical and Sociological Concepts in Education
3	Credits	4
4	Contact Hours (L-T-P)	4-0-0
	Course Type	Core
5	Course Objectives	The course will enable the People-Teachers to - 1. Promote reflective thinking among students with relation to the philosophical and sociological perspectives of Education. 2. Develop the understanding of human nature, the world and universe and their relation with man and society. 3. Sharpen their perception of the concepts involved in educational practice. 4. Enhance their capacity to formulate responses to the reality of education. 5. Critically evaluate and systematically reflect upon general theories of Education.
6	Course Outcomes	On the completion of this course, the pupil-teachers will be able to- CO-1. Explain the critical thinking process in relation to the philosophical and sociological perspectives on education. CO-2. Analyse the philosophical reflections of human nature in the context of the intimate relationship between man and society. CO-3. Examine the role and purpose of education in the contemporary educational practice. CO-4. Describe the suitable philosophical methods and guiding principles to solve the real the challenges of education.

		CO-5. Interpret the educational concerns and issues as reflected in different theoretical approaches.
7	Course Description	This course will endeavor to develop a basic understanding of philosophical process of solving educational problems through philosophical method, from a philosophical attitude to arrive at philosophical conclusions and results. It will facilitate the understanding of various areas of social life (economic system, political order, social progress, social and cultural reconstructions etc.), educational values, theory of knowledge and its relationship to education.
8	**Course Outlines**	
	Unit 1	**Basic Concepts in Philosophy of Education**
	A	Basic ideas of teaching, training and indoctrination in the context of child's education.
	B	Relationship between Philosophy and Education. Branches of Philosophy: Metaphysics, Epistemology & Axiology with special reference to school subjects
	C	Pedagogical Alternatives to Behaviourism with reference to Activity, Discovery and Dialogue based teaching-learning. 1. **Activity**: With reference to Dewey's ideas on learning and Gandhi's NaiTalim 2. **Discovery:** With reference to Montessori's description of children's intellectual growth and Dewey's concept of inquiry 3. **Dialogue**: With reference to Plato (Allegory of the Cave), the Upanishads (The Nachiketa- Yama dialogue) and Buber's idea of a dialogue between teacher and student ('I and Thou') along with a discussion on the role of a teacher
	Unit 2	**Basic Concepts in the Sociology of Education**
	A	Constitutional Perspective: Equity, Equality, Freedom, Social Justice and Education
	B	Socialization, Role of family, school and community
	C	Political ideology with reference to curriculum and textbooks formations
	Unit 3	**SOCIAL BASIS OF EDUCATION**

A	Dominance, conflict and resistance in the context of schooling.	
B	Understanding Contemporary Indian Society with reference to different aspects of Multiculturalism	
C	Education for Multiculturalism	
Unit 4	**Educational Thinkers & their ideas on aims of Education, School Curriculum, Pedagogic practices, Role of Teachers and Discipline**	
A	Gandhi, Tagore & Swami Vivekananda	
B	Paulo Freire	
C	John Dewey	
Unit 5	**Practicum**	
A	Each student should attempt at least one individual assignment and one independent project, apart from group work.	
B		
C	*Suggested Projects/Assignments:* A detailed study of one of the thinkers mentioned in the entire syllabus • Reflective Essays on philosophy of education • Film review: *'I Wonder'* , by Anupama Srinivasan/ *"Paddoge likhoge banoge nawab"* by Vani Subhramanium/ *Iqbal* by Nagesh Kukunoor/ *Dharm* by Bhavana Talwar / *'Gitanjali: Tribute to* • *Rabindranath Tagore': - A Programme on Doordarshan* by Tapas Sen Gupta	
Mode of examination	Theory	

Weightage Distribution	CA	MTE	ETE
	30%	20%	50%

Text book/s*		• Cohen, Brinda (1969). Educational Thought: An Introduction. Macmillan: Britain • Moore, T.W. (1974). Educational Theory: An Introduction. London: Routledge & Kegan Paul. • Wilson, J and Cowell, Barbara\(1928). Taking Education Seriously. London: The Falmer Press.
	Other References	• Montessori, Maria (1965). Spontaneous Activity in Education. New York: Schocken Books. • Montessori, Maria (2012). The Absorbent Mind. New Delhi: Aakar Books. • Kumar, Krishna (1977). Raaj Samajaur Shiksha. Delhi: Rajkamal. • Kumar, Krishna (1998). Shaikshik Gyan Aur Varchasv. Delhi: Granthshilpi . • Kumar, Krishna (2002). Shikshaaur Gyan. Delhi: Granthshilpi. • Kumar, Krishna (2004). What is Worth Teaching? Delhi: Orient Longman. • Buber, Martin (2006). 'Teaching and Learning' in The Writings of Martin Buber.Author: Will Herberg.Universal Digital Library.The World Publishing Company: NewYork. • Hanh, Thich Nhat (1987). *Being Peace*, Parallex Press, Unified Buddhist Church.Berkeley. • Hanh, ThichNhat (2013). *Peace of Mind.:Becoming Fully Present*. BantamPress. • Dhankar, Rohit (2006) Shiksha Aur Samajh Haryana: Aadhar Prakashan. • Woozley, A.D. (1949). Theory of Knowledge: An Introduction. London: Hutchinson's University Library. (Hindi Translation: Gyanmeemansa Parichay Patna: Bihar Hindi Granth Academy) • Mascaro, Juan (1965). The Upanishads. England: Penguin. • Freire, Paulo (1970). Pedagogy of the Oppressed. London: Penguin Books. • Elmhirst, L.K. (1994). Rabindranath Tagore: Pioneer in Education. Delhi: Sahitya Chayan. • Dewey, John (1902). The Child and the Curriculum. Chicago: The University of

		Chicago Press.
		• Dewey, John (1915). The School and Society. The University of Chicago Press.
		• Bharathi, S.V. (2010). Educational Philosophy of Swami Vivekananda. Discovery Publishing House.

SEB105: PROFESSIONAL ETHICS FOR TEACHERS

School: SOE	**Batch: 2020—2024**	
Program: B.ED.	**Current Academic Year: 2020-21**	
Branch: Education	SEM-II	
1	Course Code	SEB 105
2	Course Title	PROFESSIONAL ETHICS FOR TEACHERS
3	Credits	2
4	Contact Hours (L-T-P)	2-0-0
	Course Type	Co-Requisite
5	Course Objective	The course will enable the student-teachers to – 1- Develop better understanding about professional ethics. 2- Acquire the parameters and criteria of professional values and ethics. 3- Understand the ethical and professional issues related with teaching profession. 4- Apply ethical and professional practices during their teaching career. .
6	Course Outcomes	On the completion of this course, the pupil-teachers will be able to- CO1: Understand the Responsibilities of teachers towards teaching Profession. CO2: Develop the understanding of Responsibilities for Professional Competence. CO3: Develop awareness about Responsibilities of a teacher towards Students. CO4: Analyze the Responsibilities of teachers towards the School Community. CO5: Evaluate and apply technology in a responsible and ethical way.
7	Course Description	In this paper, the general principles of professional ethics related with teaching profession will be examined along with its varied dimensions. It will enable future teachers to be aware about the ethical and professional issues which will develop an insight about professional activities to be conducted in a fair and justified manner.
8		
	Unit 1	**Responsibility to the Profession**
	A	Responsibility to oneself as an ethical professional
	B	Obligation to address and attempt to resolve ethical issues
	C	Promoting and advancing the profession within and beyond the school community
	Unit 2	**Responsibility for Professional Competence**
	A	Commitment to high standards of practice
	B	Responsible use of data, materials, research and assessment

C	Acts in the best interest of all students	
Unit 3	Responsibility towards Students	
A	Respecting the rights and dignity of students	
B	Demonstrating an ethic of care	
C	Maintaining student trust and confidentiality when interacting with students in a developmentally appropriate manner and within appropriate limits	
Unit 4	Responsibility towards the School Community	
A	Promoting effective and appropriate relationships with parents/guardians/colleagues and employers	
B	Promoting effective and appropriate relationships with the community and other stakeholders	
C	Understanding the problematic nature of multiple relationships	
Unit 5	**Responsible and Ethical Use of Technology**	
A	Using technology in a responsible manner; promoting the appropriate use of technology in educational settings	
B	Ensuring students' safety and wellbeing when using technology	
C	Maintaining confidentiality in the use of technology	
Mode of Transaction	The course will be transacted in workshop mode through individual and group experiential activities.	
Mode of examination	Theory	
References	1.Code of Professional Ethics: By National Council of Teacher Education 2.Model of Code of Ethics for Educators: National Associations Of State Directors of Teacher Education And Certification. 3.Professional Ethics: Need for the 21st Century R. Subramanian 4.Professionalism and ethics in teaching: David Carr	
Other References	5.The Teaching and Practice of Professional Ethics:John Strain and Simon Robinson 6.Code of Professional Ethics: By NCERT	

SHARDA UNIVERSITY
Beyond Boundaries

SEB 106: CONTEMPORARY INDIA AND EDUCATION

School: SOE	Batch: 2020-2024
Program: B.Sc. B.Ed.	Current Academic Year: 2020-21
Branch: Education	Semester: II

1	Course Code	SEB 106
2	Course Title	Contemporary India and Education
3	Credits	4
4	Contact Hours (L-T-P)	4-0-0
	Course Type	Core
5	Course Objectives	1. The course will enable the People-Teachers to – 2. Appreciate the unity and strengths of Indian diversities based on region, religion, gender, languages, socio-economic factors like caste, means of livelihood etc. 3. Acquire knowledge about the salient features of our Constitution and constitutional measures to protect diversities 4. Develop understanding of the issues in contemporary India like industrialization, urbanization, globalization, modernization, economic liberalization and digitalization etc. 5. Appraise about the policy initiatives taken in education reform during pre- and post-independent India. 6. Develop overall understanding of the working and recommendations of various Commissions and Committees constituted for improving education in the country. 7. Appreciate Innovations and new measures towards universalization of education including the role of Panchayati Raj institutions. 8. Familiarize with various incentive schemes like mid-day meal, support to economically, socially and educationally backward communities 9. Develop understanding of the issues, and challenges faced by Indian contemporary Society
6	Course	After the completion of the Course the student teacher will be able to-

	Outcomes	CO1- appreciate the unity and strengths of Indian diversities based on region, religion, gender, languages, socio-economic factors like caste, means of livelihood etc.
		CO2-acquire knowledge about the salient features of our Constitution and constitutional measures to protect diversities
		CO3-develop understanding of the issues in contemporary India like industrialization, urbanization, globalization, modernization, economic liberalization and digitalization etc.
		CO4-appraise about the policy initiatives taken in education reform during post independent India.
		CO5-Develop overall understanding of the working and recommendations of various Commissions and Committees constituted for improving education in the country.
		CO6- Develop understanding about Linguistic Plurality and Language Policy in India
		CO7-analyze the policy discourse on work, skills and vocational education.
		CO8-Understand the System and Structures of various types of Schools in India
		CO9-Develop understanding about the structure and role of key institutions of education in India
7	Course Description	India, as a country and society has been in transition and has evolved as the melting pot for various diversities including religious, cultural, socio-economic, linguistic, geographical, regional and philosophical thoughts operating through maturing democratic system of interactions and governance. The country administered through rule of law and the constitution embodies the aspirations for our evolution as a cohesive society and a strong and leading nation in the world community. The continuing evolution of our egalitarian society and peaceful transformation of the nation needs to be understood by the People-Teachers. Study of this course will enable the students to understand socio-economic, linguistic, geographical etc. ethos of the nation, thereby help them effectively discharge their role in the society with numerous diversities. The People-Teachers will also

		understand the role of education as an intervention tool for desired changes in the country. The course will help the students to appreciate the influence of social set-up on education in which it operates.
8		
	Unit 1	**Indian Constitution and Education**
	A	The Constitutional Context Education as a means of social justice in the Indian Constitution; Constitutional values and education (Preamble, Fundamental rights and duties);
	B	Right to Free and Compulsory Education2010 (RTE) and inclusion;
	C	Education in the concurrent list and its implication
	Unit 2	**Social contexts and Education**
	A	The Social Context of Educational Policy Challenges posed for education by the socio-cultural and economic context: child-labour, child marriage, displacement and migration; Composition of Indian society and its implications for education:
	B	Inequality, discrimination, exclusion and marginalization in the context of language, religion, caste, class, gender, region, and disability; Issues and challenges in the education of Dalits, OBCs, the Scheduled Tribes, girls and religious minorities; the role and agency of teachers in the education of above-mentioned groups
	C	Classroom ethos as an area of enquiry from the perspective of children from diverse socio-cultural and economic backgrounds
	Unit 3	**Educational Policies and Education**
	A	A Thematic Focus on Educational Policy A critical review of commission reports and policy documents through a thematic focus, linking the contemporary context with salient debates since independence: Equity in Education: Kothari Commission and the vision of Common Schooling; National Policy on Education 1986 and its review by the Ramamurthy Committee 1992; Yashpal Report 1993 ;

		the National Curriculum Framework 2005; and NPE 2019 the MidDay Meal programme, an inclusive space for eating together;
	B	Linguistic Plurality and Language Policy: The Language Survey; debates on the 'medium' of learning; the 'three-language formula' for national and emotional integration, problems of implementation across states
	C	Work and Education: Zakir Hussain Committee, NayeeTaleem or Basic Education; work as a medium of learning, integrating skills with knowledge; Mudaliar Commission, multipurpose schools and citizenship education; critical analysis of the policy discourse on work, skills and vocational education.
	Unit 4	**Education system and Structures in India**
	A	The System and its Structures Schools in India: types and affiliation, schools run by autonomous institutions of the Central government (KVS, NVS, Sainik Schools, etc.); schools run by the State Governments; private schools; international schools;
	B	looking at institutional structures and stratification within the context of concerns for 'quality' and equity; management and public participation; role of key institutions in Shaping the policy and discourse of education: NCTE, NCERT, NIOS,Boards of Education, etc;
	C	Role of Directorates of Education, local bodies, e.g. Panchayati Raj institutions, municipal bodies.
	Unit 5	**Practicum (Any One)**
	A	• Case study of different kind of schools • Conflicts and Social Movements in India: Women, Dalit and tribal movements, • Marginalization and education of children from slums and distress migration

		• Impact of electronic media on children • Conduct of survey of government and private schools to identify various forms of inequality Survey of nearby locality to find out the causes of low literacy
	Mode of examination	Theory

	Weightage Distribution	CA	MTE	ETE
		30%	20%	50%

	Text books*	• Anand,C.L. et.al. (1983). Teacher and Education in Emerging in Indian Society, NCERT, NewDelhi. • Govt. of India (1986). National Policy on Education, Min. of HRD, NewDelhi. • Govt. of India (1992). Programme of Action (NPE). Min of HRD. • Govinda, R. (2011). *Who goes to school? Exploring exclusion in Indianeducation*. Oxford UniversityPress. • Krishnamurti, J. (1992). Education and world peace. In *Social responsibility*. KrishnamurtiFoundation. • Kumar, K. (2013). *Politics of education in colonial India*. India:Routledge. • Mani, R.S. (1964). Educational Ideas and Ideals of Gandhi and Tagore, New Book Society, NewDelhi. • Das, Manoj (1999). Sri Aurobindo on Education, National Council for Teacher Education, NewDelhi. • Mohanty, J. (1986). School Education in Emerging Society, SterlingPublishers. • Mukherji, S.M. (1966). History of Education in India, Acharya Book Depot,Baroda. • GOI (1964-1966): 'Education and National Development". Ministry of Education, Government of India1966.

- GOI (2004): Learning without Burden, Report of the National Advisory Committee. Education Act. Ministry of HRD, Department of Education, October,2004.

- NCERT (2002): Seventh All India School Education Survey, NCERT: NewDelhi.

- Naik, J.P. (1982). The education commission and after. APHPublishing.

- Naik, J.P. & Syed, N. (1974). A Student's History of Education in India, MacMillan, NewDelhi.

- NCERT (1986). School Education in India – Present Status and Future Needs, New Delhi.

- NCERT. (2005). National curriculum framework. *(NCF 2005)*. New Delhi:NCERT.

- NCERT. (2006a). Position paper-National focus group on education with specialneeds

- NCERT. (2006b). Position paper-National focus group on gender issues in the curriculum (NCF 2005).NCERT.

- NCERT. (2006c). Position paper-National focus group on problems of scheduled caste and scheduled tribe children (NCF 2005). New Delhi:NCERT.

- NCERT. (2006d). Position paper-National focus group on teaching of Indianlanguage

- Ozial, A.O. 'Hand Book of School Administration and Management', London, Macmillan.

- Radha Kumud Mookerji. Ancient Indian Education (Brahmanical and Buddhist), Cosmo Publications, New Delhi –1999.

- Sainath P. (1996). Everybody loves a good drought. Penguin Books NewDelhi.

- Salamatullah (1979). Education in Social context, NCERT, NewDelhi.

- Sykes, Marjorie (1988): The Story of Nai Talim, Naitalim Samiti:Wardha.

		• UNESCO; (1997). Learning the TreasureWithin. • Dr. Vada Mitra (1967). Education in Ancient India, Arya book Depot, NewDelhi
	Other References	• UNDPA. Human Development Reports. New Delhi. Oxford: Oxford University Press. • UNESCO. (2004) Education for All: The Quality Imperative. EFA Global Monitoring Report, Paris. • Varghese, N.V. (1995). School Effects on Achievement: A Study of Government and Private Aided Schools in Kerala. In Kuldip Kumar (Ed.) School effectiveness and learning achievement at primary stage: International perspectives. NCERT. New Delhi. • World Bank, (2004). Reaching the Child: An Integrated Approach to Child Development. Oxford University Press, Delhi

EVS103: ENVIRONMENTAL SCIENCE

School: SOE	Batch: 2020-24
Program: B.Sc. B. Ed.	Current Academic Year: 20-21
Branch: Education	Semester: II

1	Course Code	EVS103
2	Course Title	Environmental Science
3	Credits	2
4	Contact Hours (L-T-P)	2-0-0
	Course Type	Co requisite
5	Course Objective	1. The student will be able to acquire the knowledge about the Definition, principles and scope of environmental science. 2. The student will be able to understand the Structure and composition of atmosphere. 3. The student will be able to analyse the cause, Effects and Control Measures of environment. 4. The student will be able to analyse the impact of Climate Change. 5. The student will be aware about the Social Issues and the Environment.
6	Course Outcomes	CO1: The student will be able to acquire the knowledge about the Definition, principles and scope of environmental science. CO2: The student will be able to Understand the Structure and composition of atmosphere. CO3: The student will be able to analyse the cause, Effects and Control Measures of environment. CO4: The student will be able to Analyse the impact of Climate Change. CO5: The student will be aware about the effect of climatic changes on

		living being.
7	**Course Description**	The course describes about the scope of environmental science and various issues related to climatic change and its impact.
8	Outline syllabus	

	Unit 1	**General Introduction**
	A	-Definition, principles and scope of environmental science
	B	Forest Resources, Water Resources, Mineral Resources, Food Resources
	C	Energy Resources, Land Resources
	Unit 2	**Atmosphere and Meteorological Parameters**
	A	Structure and composition of atmosphere, Meteorological parameters:
	B	Pressure, Temperature, Precipitation, Humidity, Radiation, Wind speed and direction, Wind Rose,
	C	Concept of weather and climate, climatic elements
	Unit 3	**Environmental Pollution (Cause, Effects and Control Measures)**
	A	Air and water pollution, Noise pollution, Soil pollution, Solid waste management:
	B	Case studies on pollution
	C	Causes, effects and control measures of urban and industrial wastes.
	Unit 4	**Climate Change**
	A	Concept of Global Warming and greenhouse effect
	B	Ozone layer Depletion and its consequences,
	C	Climate change and its effect on ecosystem
	Unit 5	**Impact of climatic changes**
	A	Kyoto protocol on changing climate
	B	IPCC concerns on changing climate

	C	Impact of climatic change on human beings and other living beings
	Mode of examination	Theory/Jury/Practical/Viva
	Weightage Distribution	CA	MTE	ETE
		30%	20%	50%
	Text book/s*	• Joseph, Benny, "Environmental Studies", Tata Mcgraw-Hill. • S.C. Santra, "Environmental Science", 2nd Edition, New Central Book Agency (P) Ltd, Kolkata, India, 2005. • Miller, G.T., "Introduction to Environmental Science", Cengage Learning. • A Text Book of Environmental Studies, D. K. Asthana and Meera Asthana, S. Chand & Co., New Delhi.
	Other References	• Rao, P.V., "Principles of Environmental Science and Engineering", Prentice Hall of India

BSP 115: PHYSICS PRACTICAL

School: SOE	Batch: 2020-24		
Program: B.Sc. B.Ed.	Current Academic Year: 2020-21		
Branch: Education	Semester: II		
1	Course Code	BSP115	
2	Course Title	Physics Practical	
3	Credits	1	
4	Contact Hours (L-T-P)	0-0-2	
	Course Status	Co Requisite	
5	Course Objectives	1. To provide training in the broad methodology of science through investigatory type and open-ended laboratory exercises. 2. To enable the students to gain develop a hands-on approach to on the principles of oscillation by performing the experiments in the laboratory 3. To build an understanding of the principles of relation between pressure and volume of a gas at constant temperature. 4. To develop an understanding of Newtons Laws of cooling. 5. To validate the theoretical basis of the experiments.	
6	Course Description	This course helps the student to provide training in the broad methodology of science through investigatory type and open-ended laboratory exercises.	
7	Course Outcomes	CO1 Perform the experiments on Oscillations. CO2 To determine the frequency by (i) Absolute method, (ii) Comparison method. CO3 Study of variation of pressure and temperature of a gas at constant volume CO4 To determine the velocity of sound at 0° C and the end correction by setting up a resonance column (first resonance length. CO5 Study of the motion of a steel sphere in a viscous liquid and determination of the	
8			

Unit 1		
A		• Study of the oscillations of a column of water as a function of its length and study of damped oscillation
B		• To determine the velocity of sound at 0o C and the end correction by setting up a resonance column (first resonance length).
C		• Study of torsional oscillations of a loaded wire and determination of the rigidity modulus of the material of the wire.
Unit 2		
A		• Study of transverse vibrations on a sonometer. To determine the frequency by (i) absolute method, (ii) Comparison method.
B		• Study of Newton's law of cooling. • Determination of solar constant.
C		• J by Joules Calorimeter.
Unit 3		
A		• Study of the rate of flow of water through a capillary tube under different pressure heads.
B		• Study of the relation between pressure and volume of a gas at constant temperature
C		• Study of variation of pressure and temperature of a gas at constant volume.
Unit 4		
A		• To study the variation of thermo emf across two junctions of a thermocouple with temperature
B		• Surface Tension-capillary rise method-radius by vernier microscope
C		• Study of the motion of a steel sphere in a viscous liquid and determination of the coefficient of viscosity of the liquid.
Unit 5		
A		• Melde's experiment. Determination of frequency.
B		• Lees and Charlton disc. Thermal conductivity of a bad conductor
C		• Specific heat of a solid by the method of mixtures.
Mode of Examination	Jury+Practical+Viva		
Weightage	CA	MTE	ETE

Distribution	60%	0%	40%
Text books*			
Other References	- B.L. Flint & H.T. Worsnop, Advanced Practical Physics for students, Asia Publishing - House, 1971. - E Armitage, Practical Physics, John Murray. - PSSC Physics Laboratory Guide. S. Panigrahi & B. Mallick, Engineering Practical Physics, Cengage Learning India Pvt. Ltd., 2015 - Indu Prakash and Ramakrishna, A Text Book of Practical Physics, 11th Edition, Kitab - Mahal, New Delhi, 2011. - Jerry D Wilson and Cecilia A. Hernandez-Hall Physics Laboratory - Experiments7thEdition, Cengage Learning, 2009. - D.P. Khandelwal, a Laboratory Manual of Physics for Undergraduate Classes, Vani Publication, 1985.		

BSP116: BIOANALYTICAL TECHNIQUES LAB

School: SOE	Batch: 2020 – 2024
Program: B.Sc. B.Ed.	Current Academic Year: 2020-21
Branch: Education	Semester: II

1	Course Code	BSP116
2	Course Title	Bioanalytical Techniques Lab
3	Credits	1
4	Contact Hours (L-T-P)	0-0-2
5	Course Status	Co Requisite
6	Course Objective	To get a brief idea about different bioanalytical techniques commonly use in the biotech laboratories
7	Course Outcomes	After successfully completion of this course, students will be able to: CO1: To understand how to prepare the solutions and buffers CO2: To know the procedure of cell lysis and different extraction methods CO3: To know the basic principle of spectroscopy and discuss different types of spectroscopies CO4: To discuss different types of chromatography techniques CO5: To learn estimation and purification of DNA and gel electrophoresis
8	Course Description	This course will help us to understand the preparation of different solutions and buffers, types of cell lysis and extraction methods. Also, students will learn the working principles and applications of various bioanalytical techniques which will help them to enhance their basic and advanced knowledge on biotech research.
9	Outline syllabus	
	Unit 1	**Preparations of Solutions and Buffers**
	A	Preparation of buffer solutions of various pH
	B	Preparation of solutions with various molarity and normality solutions, ppm solutions
	C	Preparation of Standard Solution of Acids and Bases
	Unit 2	**Cell lysis and Extraction methods**

A	Mechanical lysis of Cells,	
B	Chemical lysis of Cells,	
C	Extraction of cell lysate	
Unit 3	**Spectroscopy**	
A	Principles and working of UV-VIS spectrophotometer	
B	Preparation of standard curve	
C	Verification of Beer Lambert's Law	
Unit 4	**Chromatography**	
A	Paper Chromatography	
B	Thin Layer Chromatography	
C	Principle of HPLC	
Unit 5	**Advance techniques in molecular biology**	
A	Purification and estimation of DNA from plants	
B	Purification and estimation of DNA from bacteria	
C	Agarose Gel Electrophoresis	
Mode of examination	Practical	

Weightage Distribution	CA	MTE	ETE
	60 %	0 %	40 %

Textbook/s*	Principles of Biochemistry, Latest Edition, A.L. Lehninger, D.L. Nelson, M.M. Cox., Worth Publishing
Other References	1. Biochemistry by Mathews, Van Holde. 2. Textbook of Biochemistry by Metzler 3. Biological Instrumentation and Methodology by Dr. PK Bajpai 4. The Tools of Biochemistry by Cooper 5. Practical biochemistry by Wilson and Walker

BSP 117: CHEMISTRY PRACTICAL

School: SOE	**Batch:** 2020-24	
Program: B.Sc. B. Ed	**Current Academic Year:** 2020-21	
Branch: Education	**Semester: II**	
1	**Course Code**	**BSP117**
2	**Course Title**	**Chemistry Practical**
3	**Credits**	1
4	**Contact Hours (L-T-P)**	0-0-2
	Course Status	Co Requisite
5	**Course Objectives**	1. To evolve a scheme of qualitatively analysing an inorganic mixture classification of anions 2. To help the students develop an understanding into the methods of analysing cations. 3. Quantitative inorganic analysis of mixtures containing four radicals. 4. To develop skills of synthesizing coordination compounds. 5. To perform the experiments related to the theoretical aspects of cations and anions
6	**Course Outcomes**	After the completion of this course, the students will be able to CO1: observe typical reactions of common cations. CO2: learn how to identify a cation from its chemical reaction. CO3: develop a systematic scheme of separation and analysis of a selected group of cations. CO4: identify the anionic radicals present in an inorganic mixture of salts by performing various tests. CO5: gain experience with logically developing a qualitative analysis scheme for anions.
7	**Course Description**	The course provides a modern level of the theoretic and practical development in analysis of substances, their mixtures. It provides for the qualitative analysis of ions present in a mixture and develop a systematic scheme for it.

8	**Course Outlines**	
	Unit 1	**Qualitative analysis of cations**
	A	• First group cations: Lead (II) and Silver (I)
	B	• Second group cations: Lead (II), Bismuth (III), Copper (II), cadmium (II), Tin (II) and (IV)
	C	• Second group cations: Lead (II), Bismuth (III), Copper (II), cadmium (II), Tin (II) and (IV)Contd…
	Unit 2	**Qualitative analysis of cations**
	A	• Third Group cations: Iron (II) and (III), Aluminium (III), Chromium (III), Nickel (II)
	B	• Third Group cations: Iron (II) and (III), Aluminium (III), Chromium (III), Nickel (II)
	C	• Third group cations: Cobalt (II), Manganese (II) and Zinc (II)
	Unit 3	**Qualitative analysis of cations**
	A	• Fourth group cations: Barium (II), strontium (II) and calcium (II)
	B	• Fourth group cations: Barium (II), strontium (II) and calcium (II)
	C	• Fifth group cations: Magnesium (II), Sodium (I), potassium (I), ammonium (I)
	Unit 4	**Qualitative estimation of anions**
	A	• Estimation of anions: chloride, bromide and iodide in strong acidic medium
	B	• Estimation of anions in dilute acidic medium such as sulphite (SO_3^{2-}), sulphate (SO_4^{2-}), carbonate (CO_3^{2-}) and bicarbonate (HCO_3^-)
	C	• Estimation of anions in dilute acidic medium such as sulphite (SO_3^{2-}), sulphate (SO_4^{2-}), carbonate (CO_3^{2-}) and bicarbonate (HCO_3^-)
	Unit 5	**Qualitative estimation of anions**

	A	• Qualitative estimation of acetate (CH_3COO^-) and chromate (CrO_4^{2-}) in the salt
	B	• Oxidation of iron (II), iodide (I^-), sulphite (SO_3^{2-}) and nitrite (NO_2^-) in presence of potassium dichromate using sulphuric acid as an oxidizing agent.
	C	• Oxidation of iron (II), iodide (I^-), sulphite (SO_3^{2-}) and nitrite (NO_2^-) in presence of potassium dichromate using sulphuric acid as an oxidizing agent.
	Mode of Examination	Jury+Practical+Viva
	Weightage Distribution	CA	MTE	ETE
		60%	0%	40%
	Text books*	• A Text Book of Quantitative Inorganic Analysis, A.I. Vogel
	Other References	• Advanced Practical Inorganic Chemistry, Gurudeep

BSP118: MICROBIOLOGY LAB

School: SOE		**Batch: 2020-24**
Program: BSc. B. Ed.		**Current Academic Year: 2020-21**
Branch: Education		**Semester: II**
1	**Course Code**	**BSP 118**
2	**Course Title**	**Microbiology Lab**
3	**Credits**	1
4	**Contact Hours (L-T-P)**	0-0-2
	Course Status	Co Requisite
5	**Course Objectives**	1. To develop a structured classification of Different types of microbes. 2. To Understand different staining techniques for different microbes. 3. To have an overview of the various culturing techniques of different microbes. 4. To have a Preservation and control of Microbial Growth 5. To develop a working knowledge of the use different instruments used for microbiological experiments.
6	**Course Outcomes**	CO1: Understand Basic requirements of Microbiological laboratories. CO2: Demonstrate various techniques for culturing of microbes. CO3: Demonstrate various staining methods of microorganisms. CO4: Describe various methods of isolation of microorganisms from different samples.
7	**Course Description**	This course provides insight to various requirements of microbiology laboratories. The various instruments and glassware's used for culturing microbes. It also enables students to isolate, stain and maintain cultures of various microbes like bacteria, fungi, algae etc. from various samples of air, water and soil.
8	**Course Outlines**	
	Unit 1	**Introduction to microbiology**

		Sub unit - a, b and c detailed in Instructional Plan
	Unit 2	**Bacterial Morphology, Nutritional Requirements and Growth**
		Sub unit - a, b and c detailed in Instructional Plan
	Unit 3	**Preservation and control of Microbial Growth**
		Sub unit - a, b and c detailed in Instructional Plan
	Unit 4	**Overview of Virus, Algae and Fungi**
		Sub unit - a, b and c detailed in Instructional Plan
	Unit 5	**Brief Overview of Virus, Algae and Fungi**
		Sub unit - a, b and c detailed in Instructional Plan
	Mode of Examination	Jury/Practical/Viva

	Weightage Distribution	CA	MTE	ETE
		60%	0%	40%

	Text book/s*	R C Dubey and D K Maheshwari "Practical Microbiology" S Chand & Company Ltd. 2005
	Other References	Brock, T.D. (1990) Microbiology: A text book of Industrial Microbiology. 2nd edition, Sameur Association.

List of Practical's:

Week 1	Unit 1	Practical related to --	
	a	Lab expt.1	Basic rules and requirements of Microbiology laboratory
	b	Lab expt.2	Methods of sterilization
Week 2	c	Lab expt.3	Preparation of cotton plugs-temporary and permanent
	Unit 2	**Practical related to --**	
	a,b	Lab expt.4	Preparation of medium for culture of microorganisms.
	c	Lab expt.5	Various methods of pure culture techniques.
	Unit 3	**Practical related to –**	

Week 7	Mid term		
	a,b,c	Lab expt.6	Sampling of microbes from air water and soil.
	Unit 4	**Practical related to –**	
	a,b,c	Lab expt.7	Methods for staining of microorganisms.
	Unit 5	**Practical related to –**	
	a	Lab expt.8	Isolation of yeast from sugary/starchy material
	b	Lab expt.9	Isolation of Phylloplane microflora.
Week 14	c	Lab expt.10	Isolation and enumeration of bacteria and fungi from soil.

SEMESTER- III

BSI 205: ELECTRICITY AND ELECTROMAGNETISM

School: SOE	Batch: 2020-24
Program: B.Sc. B.Ed.	Current Academic Year: 2021-22
Branch: Education	Semester: III

1	Course Code	BSI 205
2	Course Title	Electricity and Electromagnetism
3	Credits	4
4	Contact Hours (L-T-P)	4L+ 0T +0P
	Course Status	Core
5	Course Objectives	1. To enable students to acquire a broad conceptual framework of electrostatics electromagnetic phenomena. 2. To establish a foundation in electromagnetism 3. To make the students learn fundamental concepts of electricity, magnetism and circuit theory to use them in real life problems. 4. To help the students learn magnetic effect of current, define magnetic flux density, Bio-Savart's Law, Ampere's Law and the divergence and curl of B. 5. **To** enable the students, Acquire knowledge of DC circuits, Kirchoff's laws for DC circuits, mesh and loop analysis, RC.
6	Course Outcomes	After the completion of this course, the student will be able to **CO1:** Understand Coulomb's Law of force, Electric field, Gauss Law and will solve problems based on it, Electric potential and electrostatic energy. **CO2:** Distinguish different types of capacitors and derive energy stored in a capacitor, force of attraction between capacitor plates. **CO3:** Acquire knowledge of DC circuits, Kirchhoff's laws for DC circuits, mesh and loop analysis, RC

		CO4: Explain electromagnetic induction, Faraday's law of induction, Lenz's law, self and mutual inductance; Evaluate energy stored in magnetic field, inductances in series and parallel combination.
		CO5: Learn magnetic effect of current, define magnetic flux density, Bio-Savart's Law, Ampere's Law and the divergence and curl of B.
		CO6 classify magnetic material as di, para and ferro magnetic.
		CO7: Describe the fundamental principles of electrostatics and magnetostatics and utilize various theories of electricity and magnetism and extend their applications to electrical instruments.
7	**Course Description**	This course describes the various laws related to electricity and magnetism laying foundation for advance courses such as electromagnetic theory. The course also provides an understanding of electromagnetic induction to further describe the properties of electrical circuits.
8	**Course Outlines**	
	Unit 1	**ELECTROSTATICS**
	A	• Electrostatic Field, electric flux, Gauss's theorem of electrostatics. Applications of Gauss's Theorem.
	B	• Electric field due to point charge, infinite line of charge, uniformly charged spherical shell and solid sphere, plane charged sheet, charged conductor.
	C	• Electric potential as line integral of electric field, potential due to a point charge, electric dipole, uniformly charged spherical shell and solid sphere and continuous charge distributions (charged rod, ring, and disk). Calculation of electric field from potential.
	Unit 2	**ELECTRIC FIELDS IN MATTER**
	A	• Capacitance of an isolated spherical conductor. Parallel plate, spherical and cylindrical Condenser. Combination of capacitors, energy stored in a capacitor, Energy per unit volume in electrostatic field.
	B	• Atomic view of dielectrics, Polarization, Displacement vector, Dielectric

		constant, and Parallel plate capacitor completely filled with dielectric.
C		• Polarizability and susceptibility.
Unit 3	**DC CIRCUITS**	
A		• DC Circuits: Kirchhoff's laws, Voltage and Current dividers
B		• Mesh analysis and Loop analysis, RC circuits, and Maximum power transfer theorem.
C		• Mesh analysis and Loop analysis, RC circuits, Maximum power transfer theorem
Unit 4	**MAGNETISM**	
A		• Magnetostatics: Biot-Savart's law and its applications- straight conductor, circular coil, solenoid carrying current.
B		Magnetic force between two parallel current carrying conductors. The Divergence and Curl of B, Ampere's circuital law. Magnetic field due to a very long solenoid and a toroidal coil.
C		• Magnetism in matter: Magnetic intensity, magnetic induction, Magnetic susceptibility, • Permeability. Classification of magnetic substances- a brief introduction of di-magnetic, para-magnetic and ferro-magnetic materials.
Unit 5	**ELECTOMAGNETIC INDUCTION AND AC CIRCUITS**	
A		• Electromagnetic Induction: Review of Faraday's law of induction, Lenz's law, Motional EMF. • Inductance: Self-inductance, energy in a magnetic field, magnetic energy density.
B		AC circuits: sinusoidal voltage, current voltage relation in resistance, capacitance and inductance, Reactance and impedance
C		• Power in AC circuits, RMS values, Power factor, LR and CR circuits.

		Series and parallel LCR circuits. Resonance.
	Mode of Examination	Theory
	Weightage Distribution	CA	MTE	ETE
		30%	20%	50%
	Text Books	D C Tayal, Electricity and Magnetism, 1988, Himalaya Publishing House.
	Other References	- David J. Griffiths, Introduction to Electrodynamics, 4th Edition, Pearson - David Halliday, Robert Resnick and Jearl Walker, Fundamentals of Physics, 6th Edition, John Wiley, Inc. - A N Matveev, Electricity and Magnetism, Mir Publishers, Moscow. - F.W.Sears, Electricity and Magnetism, Addison Wesley Co. - A F Kipp, Fundamentals of Electricity and Magnetism, McGraw Hill. - Edward M. Purcell, Electricity and Magnetism, McGraw-Hill Education, 1986. - J.H. Fewkes & J. Yarwood, Electricity and Magnetism, Vol. I, Oxford Univ. Press, 1991. 8. Ronald Lane Reese, University Physics, 2003, Thomson Brooks/Cole.

BSI 206: MYCOLOGY AND PHYCOLOGY

School: SOE		Batch: 2020-2024
Program: B. Sc. B.Ed.		Current Academic Year: 2021-22
Branch: Education		Semester: III
1	Course Code	BSI 206
2	Course Title	Mycology and Phycology
3	Credits	4
4	Contact Hours (L-T-P)	4-0-0
	Course Status	Core
5	Course Objectives	1. To acquaint the students about microscopic details of thallus structure of fungi and algae
		2. To develop understanding of reproductive structures of fungi and algae
		3. To learn about stages of cellular processes and cell cycle
		4. To understand economic importance of algae and fungi
		5. To develop an understanding about the methods of algal and fungal culture
6	Course Outcomes	After finishing the course, the students will be able to
		CO1: Understand the morphological characteristics of fungi under microscope
		CO2: Understand the morphological characteristics of algae under microscope
		CO3: Appreciate the industrial and social importance of fungi and algae
		CO4: Comprehend the method of extraction of important biomolecules from fungi and algae
		CO5: Recollect the methods of algal and fungal culture
		CO6: Analyze the life cycle stages and structures of fungi and algae
Course Descriptio		The course gives an insight into the morphology and physiology of selected algae and fungi, their role in the environment, agriculture, biotechnology, industry and disease. It provides a

n	practical foundation for careers in microbiology, food industry, environment and biotechnology.		
	Course Outlines		
	Unit 1		**Introduction to Mycology**
		A	Occurrence and distribution, somatic structure, Cell wall composition hyphal growth, nutrition, Thallus organization; heterothallism
		B	Role of fungi in ecosystem; Saprophytic parasitic, mutualistic and symbiotic relationship with plants and animals
		C	Classification of fungi
	Unit 2		**Characteristics of Fungi**
		A	General characteristics; Ecology; Thallus organization;
		B	Life cycle, reproduction with reference to Olpidium, Rhizopus, Neurospora, Peziza, Puccinia (Physiological Specialization
		C	*Agaricus, Phytophthora*; Status of Slime molds
	Unit 3		**Introduction to Phycology**
		A	Occurrence and distribution, thallus organization, Cell structure and components; cell wall, pigment system, reserve food (of only groups represented in the syllabus), flagella
		B	methods of reproduction;
		C	Significant contributions of important phycologists
	Unit 4		**Economic Importance of Algae**
		A	Algae as food supplement; Role of cyanobacteria and selected microalgae in agriculture- biofertilizer;
		B	Production of algal pigments, biofuels and hydrogen
		C	Role of algae in the environment, agriculture, biotechnology and industry
	Unit 5		**Economic Importance of Fungi**
		A	Role of fungi in biotechnology
		B	Application of fungi in food industry;
		C	Secondary metabolites; Agriculture (Biofertilizers); Mycotoxins
	Mode of Examination		Theory
	Weightage Distribution		CA MTE ETE
			30% 20% 50%
	Suggested Readings		Kumar, H.D. (1999). Introductory Phycology. Affiliated East-West. Press Pvt. Ltd. Delhi. 2nd edition.
			Alexopoulos, C.J., Mims, C.W., Blackwell, M. (1996). Introductory Mycology, John Wiley and Sons (Asia), Singapore. 4th edition.

SHARDA UNIVERSITY
Beyond Boundaries

BSI 207: ORGANIC CHEMISTRY - I

School: SOE		Batch: 2020-24
Program B.Sc. B. Ed		Current Academic Year: 2021-22
Branch: Education		Semester: III
1	Course Code	BSI 207
2	Course Title	Organic Chemistry – I
3	Credits	4
4	Contact Hours (L-T-P)	4L+ 0T +0P
	Course Status	Compulsory
5	Course Objectives	1. To provide information about basics of structure, bonding and mechanism of organic reactions 2. To impart knowledge about stereochemistry of organic compounds. 3. To review the concept of isomerism and its types. 4. To develop an understanding of chemistry of hydrocarbons and their halogenated derivatives.
6	Course Outcomes	After the completion of this course, the students will be able to- CO1: determine stereochemistry of organic compounds. CO2: describe the fundamental reactions of aliphatic hydrocarbons and identify the conformational analysis of cycloalkanes. CO3: identify the structure and properties of alkynes. CO4: explain the structure and fundamental chemical reactions of aromatic hydrocarbons, illustrate the preparative methods of simple aromatic compounds CO5: explain the formation and reaction mechanism of alkyl and aryl halides.
7	Course Description	This course provides information about basics of structure, bonding and mechanism of organic reactions and impart knowledge about

stereochemistry of organic compounds. It also discusses the formation and reaction mechanism of aliphatic and aromatic hydrocarbons.

8	Course Outlines	
	Unit 1	**STEREOCHEMISTRY OF ORGANIC COMPOUNDS**
	A	• **Optical Isomerism:** Introduction, Structural changes responsible for properties: molecular chirality, enantiomers, stereo genic centre, optical activity, properties of enantiomers, chiral and achiral molecules with two stereo genic centres, diastereomers, and meso compounds. Relative and absolute configuration, sequence rules, D & L and R & S systems of nomenclature.
	B	• **Geometric isomerism:** Determination of configuration of geometric isomers. Cis – Trans and E & Z system of nomenclature, geometric isomerism in oximes and alicyclic compounds.
	C	• **Conformational isomerism:** Difference between configuration and conformation. Conformational analysis of n-butane; conformations of cyclohexane, axial and equatorial bond, Review of Newman projection and Sawhorse formulae, Fischer and flying wedge formulae.
	Unit 2	**ALIPHATIC HYDROCARBONS-I**
	A	• Methods of formation of alkanes: (Wurtz reaction, Kolbe reaction, Corey-House reaction and decarboxylation), physical properties and chemical reactions of alkanes, Mechanism of free radical halogenation of alkanes: orientation, reactivity and selectivity
	B	• Methods of formation cycloalkanes (Dieckmann reaction), chemical reactions (halogenation), Methods of formation alkenes: (by dehydration, dehydrohalogenation and dehalogenation) with

		mechanism. The Saytzeff rule, Hofmann elimination.
	C	• Physical properties and Chemical reactions of alkenes – mechanism of hydrogenation, electrophilic and free radical additions, Markownikoff's rule, hydroboration followed by oxidation, oxymercuration – reduction. Epoxidation, ozonolysis, hydration, hydroxylation and oxidation with $KMnO_4$ and polymerization.
Unit 3		**ALIPHATIC HYDROCARBONS –II**
	A	• Alkynes: Methods of formation (alkylation of acetylene and by elimination reactions). Acidity of alkynes.
	B and C	• Chemical reactions of alkynes: Mechanism of electrophilic and nucleophilic addition reactions, hydroboration, oxidation, metal-ammonia reductions, oxidation and polymerization.
Unit 4		**AROMATIC HYDROCARBONS**
	A	• Structure of benzene, molecular formula and Kekule structure, resonance structure, Aromaticity, The Huckel rule, aromatic ions. Aromatic electrophilic substitution: General pattern of the mechanism
	B	• Chemical reactions of benzene: Mechanism of nitration, halogenation, sulphonation, Friedel-Crafts reaction.
	C	• Energy profile diagrams. Activating and deactivating substituents, orientation and ortho/ para ratio.
Unit 5		**ALKYL AND ARYL HALIDES**
	A	• Methods of formation of alkyl halides, chemical reactions. Mechanism of nucleophilic substitution reactions of alkyl halides

		SN2 and SN1 reactions with energy profile diagrams. Applications of polyhalogen compounds: chloroform, carbon tetrachloride.
	B	• Aryl halides: Methods of formation of aryl halides, nuclear and side chain reactions. The addition- elimination and the elimination-addition mechanisms of nucleophilic aromatic substitution reactions.
	C	• Relative reactivities of alkyl halides vs allyl, vinyl and aryl halides.

Mode of Examination	Theory		

Weightage Distribution	CA	MTE	ETE
	30%	20%	50%

References-	•
	• Organic Chemistry: Solomoms'
	• Organic Chemistry: Seyhand N Ege
	• Organic Chemistry: Morrison and Boyd
	• Organic Chemistry: I L Finar
	• Organic Chemistry: Hendricson, Cram and Hammond
	• Organic Chemistry: Stanley H. Pine

BSI 208: REAL ANALYSIS

School: SOE		**Batch: 2020-24**
Program: B.Sc .B. Ed.		**Current Academic Year: 2020-21**
Branch: Education		**Semester: III**
1	**Course Code**	**BSI 208**
2	**Course Title**	**Real Analysis**
3	**Credits**	5
4	**Contact Hours (L-T-P)**	4-1-0
	Course Status	Core
5	**Course Objectives**	At the end of the course students will be able to understand the concepts of real number system, real sequences, infinite series and the convergence tests. Also understand the concept of Riemann integration and its properties.
6	**Course Outcomes**	CO1: Discuss the basic concepts of set theory on R, open & closed sets, bounded & unbounded sets, countable & uncountable sets and calculate the limit points of sets. (K2, K3) CO2: Describe the concept of Limit, Continuity, and Continuous & Discontinuous functions, Uniform continuous functions and calculate same. (K2, K3) CO3: Define the definition of derivatives, increasing & decreasing functions, explain Darboux's theorem, Rolle's theorem, Men Value Theorem & its applications. (K1, K4) CO4: Calculate and analyze the convergent sequences, limit point of sequence, non-convergent sequence, and monotonic sequences. (K3, K4) CO5: Explain the concept of series and illustrate the test for series. (K2, K3, K4) CO6: Evaluate Positive terms series, Alternating series, Series with arbitrary terms. (K6)

7	**Course Description**	This is an introductory course of real analysis. Students are introduced to the fundamental concepts of real analysis. The notion of limit, continuity, differentiability, sequences, infinite series & their convergence has been also introduced
8	**Course Outlines:**	
	Unit 1	
	A	The field axioms; Theorems about field properties, Order in R-Absolute value, Completeness,
	B	Some important subsets, Intervals, Countable and Uncountable sets.
	C	Neighborhoods, Open Sets, Closed Sets, Limit points of a set, Closure of a set, Interior of a set, Compactness, Connectedness.
	Unit 2	
	A	Introduction to sequences, Convergent sequences, Divergent sequences, Oscillatory sequences, Bounded sequences, Some important limit sequences,
	B	Bounded sequences, Some important limit theorems, Cauchy sequences,
	C	Monotonic sequences, Cluster points of a sequence, Limit superior and limit inferior of a sequence, Subsequence
	Unit 3	
	A	Introduction to Infinite Series, Sequence of partial sums of a series, Convergent series,
	B	Cauchy's general principle of Convergence for Series, A necessary condition for convergence,
	C	Series of positive terms.

Unit 4		
A	Comparison test, Cauchy's nth root test,	
B	D'Alembert's Ratio test, Raabe's test,	
C	Riemann Integration: Upper and lower sums.	
Unit 5		
A	Fundamental theorem of Calculus,	
B	Change of variables, Integration by parts	
C	First and Second Mean Value Theorems of Integral Calculus.	
Mode of Examination	Theory	

Weightage Distribution	CA	MTE	ETE
	30%	20%	50%

References	Real Analysis by J.M. Howie, Springer 2007.

- Real Analysis by Malik, Wiley Eastern.
- Mathematical Analysis by Shanthinarayan, S. Chand and Co. Ltd.
- Mathematical Analysis by Malik and Savita Arora, New Age International Pvt. Ltd.
- Real Analysis by Royden, Prentice Hall of India Pvt. Ltd.
- Mathematical Analysis by T M Apostal, Addison Wesley, Narosa, New Delhi, 2nd Edition.
- Introduction to Real Analysis by Bartle R G & Sherbert , Wiley India
- Kumar Ajit&Kumaresan S, Real Analysis, CRC Press
- Principles of Mathematical Analysis by Walter Rudin, 2nd Edition, McGraw Hill Book Company, 1984.
- Analysis I and II, Torence Tao, Hindustan Book Agency, India, 2006.

BSI 209: NON-CHORDATES

School: SOE	Batch: 2020-2024
Program: B. Sc. B.Ed.	Current Academic Year: 2021-22
Branch: Education	Semester: III

1	Course Code	BSI 209
2	Course Title	Non-Chordates
3	Credits	4
4	Contact Hours (L-T-P)	4-0-0
	Course Status	Core
5	Course Objective	1. To be familiar with the different non-chordate phyla and distinguish between lower and higher organism. 2. To familiarize the students with distinctive features of lower invertebrate phyla, including poriferans, protists and protozoans 3. Develop an understanding of features of taxonomic classes within Cnidarians and ctenophores. 4. To predict and construct relationship between the complex evolutions process for rearranging study contrasts in the life processes of different phyla. 5. Trace the evolution of Arthopodas as higher invertebrates and predict their role in zoology.
6	Course Outcomes	After successfully completion of this course students will be able to: CO1: Recognize common and distinctive features of lower invertebrate phyla, including poriferans, protists and protozoans. CO2: Sketch distinctive features of taxonomic classes within Cnidarians and ctenophores. CO3: Assess distinctive measurable features of different group of helminthes and pathogenicity caused by them.

		CO4: Summarize characteristics of Annelids and Arthropodans with their economic importance.
		CO5: Combine the characteristic of different phyla to formulate and prepare phylogenetic relationship amongst invertebrates.
7	**Course Description**	At the end of the course, the students will be familiar with the non-chordate world that surrounds us. They will be able to appreciate the process of evolution and see how it progressed from simple, unicellular cells to complex, multicellular organisms.
	Course Outlines	
	Unit 1	**Protista, Metazoan and Porifera**
	A	General characteristics and Classification of Protista; General account of locomotion in Protista
	B	Study of Euglena; Life cycle of Paramecium, Segmentation of Metazoan
	C	General characteristics and classification of sponges; Canal system in porifera
	Unit 2	**Unit 2: Cnidaria and Ctenophora**
	A	General characteristics and Classification up to classes in Cnidaria
	B	Structure and life cycle of *Obelia*; polymorphism in Obelia
	C	Evolutionary significance of Ctenophora
	Unit 3	**Unit 3: Platyhelminthes and Nemathelminths**
	A	General characteristics and Classification of Platyhelminthes
	B	General characteristics and Classification of Nemathelminths
	C	Life cycle of *Taenia solium*, *Ascaris Lumbricoides* and *Wuchereriabancrofti*

Unit 4	**Annelida**		
A	General characteristics in Annelida;		
B	Classification of Annelida		
C	Excretion in Annelida		
Unit 5	**Arthropoda**		
A	General characteristics of Arthropoda		
B	Classification of Arthropoda		
C	Vision and Respiration in Arthropoda		
Mode of Examination	Theory		
Weightage Distribution	CA	MTE	ETE
	30%	20%	50%
Text book/s*	Kotpal, R. L. *Modern Text Book of Zoology: Invertebrates*. Rastogi Publications, 2012.		
Other References	1. Purves, William K., Gordon H. Orians, David Sadava, and H. Craig Heller. *Life: The Science of Biology: Volume III: Plants and Animals*. Vol. 3. Macmillan, 2003. 2. Campbell, N., and J. Reece. "Biology 7th edition, AP." (2005).		

SEB 101: HUMAN DEVELOPMENT, LEARNING, COGNITION AND DIVERSITY IN EDUCATION

School: SOE	**Batch: 2020-2024**	
Program: B.Sc .B.E	**Current Academic Year: 2021-22**	
Branch: **Education**	**Semester: III**	
1	**Course Code**	**SEB 101**
2	**Course Title**	**Human Development, Learning, Cognition and Diversity in Education**
3	**Credits**	**4**
4	**Contact Hours (L-T-P)**	**4-0-0**
	Course Type	Core
5	**Course Objectives**	The course will enable the student-teachers to- 1. Facilitate a complete understanding of the development, learning and uniqueness of the growing child in diverse socio-cultural contexts. 2. Foster the understanding and appreciation of inter-linkages between human development, diversity and uniqueness. 3. Evaluate key universal constructs in developmental psychology and educational psychology and their applications from the perspective cultural diversity. 4. Embed the classroom discussions, perspective building and practicum tasks in inclusive education. 5. Develop the potential for perspective building located in the Indian socio-cultural context through practicum, academic readings and classroom teaching/discussion.
6	**Course Outcomes**	On the completion of this course, the pupil-teachers will be able to- CO1. Develop an understanding of the concept and nature of learning and also could foresee learning in diverse contexts.

		CO2. Analyze the educational implications of the different approaches to learning apply them in real classroom situations.
		CO3. Work upon the issues and challenges that explicit in teaching and learning process.
		CO4. Play the role of a teacher as leader, organizer, a facilitator & a humane reflective practitioner and try to make the classroom environment conducive for learning.
		CO5-Explore, analyse the new trends in teaching and learning and enjoy teaching as a profession.
7	**Course Description**	This course endeavors to develop a thoughtful understanding of development processes and learning and some of the major perspectives and theories underlying them. It enables to develop an understanding and appreciation of human diversity and the challenges stemming from it in the institutions and society, especially in the context of India. The course also aims at promoting an appreciation of the role of context and culture on development and learning in culturally diverse societies, the challenges which children experience in their development and learning, particularly in the context of diversity. The socio-cultural perspective of Indian societies would form the context in which teaching, practicum, and course transaction would be placed.
8	**Course Outlines**	
	Unit 1	Human Development its Concept
	A	Meaning, characteristics, factors associated with Approaches to Learning (Concept, Associated Concepts Basic Principles and Educational Implications)-Habitual Learning, Associative Learning (Classical and Instrumental Conditioning), cognitivist, information-processing view, humanistic, Social-constructivist (Drawing selectively on the ideas of Rogers, Vygotsky, Bruner and Ausubel).
	B	Distinctions between learning as 'construction of knowledge 'and learning as 'transmission and reception of knowledge, Processes to facilitate 'construction of knowledge: (i) Experiential learning and reflection

	(ii) (ii) Social mediation
	(iii) Cognitive negotiability
	(iv) Situated learning and cognitive apprenticeship
	(v) Meta-cognition
C	Types of Learning, learning styles, Meaningful learning
Unit 2	**Understanding the Components of Learning**
A	**Attention**-Meaning, Factors Influencing Attention, Strategies for Enhancing Attention; **Perception** -Meaning, Laws of Perceptual Organization (Gestalt Psychologists View). Process **of Memory**- Sensory Registration, Retention(Storing), Recognition, Recall; Factors Influencing Retention; Strategies for Enhancing Memory, **Transfer of Learning**- Concept, Types, Strategies for Enhancing Positive Transfer of Learning, **Achievement Motivation** - Concept, Intrinsic and Extrinsic Motivation; Strategies for enhancing Achievement Motivation in Students
B	Learning in 'Constructivist' Perspective**:** Distinctions between learning as construction of knowledge 'and learning as transmission and reception of knowledge', Processes to facilitate construction of knowledge:
	(i) Experiential learning and reflection
	(ii) Social mediation
	(iii) Cognitive negotiability
	(iv) Situated learning and cognitive apprenticeship
	(v) (v) Meta-cognition
C	Issues and Concerns in learning: diversity, marginalization, gender inequality, socio-cultural background, multilingualism, Problems of adjustment, emotional disturbance and risk behavior, Identity Crisis, Parent child conflict, Drug addiction and Abuse, Bullying, Juvenile delinquency, health & personal hygiene.
Unit 3	**Understanding Teaching**
A	What is meant by teaching (teaching as a practice, activity and performance), Teaching as a complex activity, Phases of teaching, levels of teaching, Maxims of Teaching, Basic model of Teaching.
B	Teaching in a diverse classroom (addressing the diversity of student in classroom. Diversity in cognitive abilities learning styles diversity due to socio-cultural context language diversity (multilingualism) differences resulting from disabilities, gender difference, diversity of student at risk), Effective Classroom Management-Principles and

	Strategies.
C	Role of teacher in teaching-learning situations: as a) transmitter of knowledge, b) facilitator, c) negotiator, d) co-learner. Reflective Teaching to enhance learning, strategies, Teacher as a critical pedagogue
Unit 4	**Teaching as a Profession**
A	Teaching as profession (basic characteristics required for qualifying it as a profession, Characteristics of an effective teacher, Teacher communication.
B	Professional development of teachers: -Need (link between professional development of teacher and substantial school improvement and student learning). -Phases of Professional Development (Pre-service and In-service). -Approaches (i) Conventional face to face (through various institutions). (ii) Action Research (iii) Professional Learning Communities (PLC) (iv) Self-initiated learning (v) Professional Development through distance mode Facilitating professional development
C	Teacher Autonomy and Teacher Accountability
Unit 5	**Practicum**
	• Preparation of report of observation of two classroom transactions on any subject in respect of the indicators of meaningful learning, • Preparation of a paper for a seminar presentation on comparing the educational implications of any two theories of learning in the context of promoting meaningful learning. • Survey of teachers' classroom activities of at least 10 teachers and preparation of report. • Conducting group activities in the classroom and preparing a report on the

process in terms of students' participation and quality of learning.

- Student teachers may be asked to visit nearby schools (at least four different schools).

- Observe teaching learning process in some classrooms for few days. Make records and prepare a presentation highlighting various kinds of teaching and learning which they observed there.

- Observe a class in a practising school for few days and prepare a note highlighting how teachers addressed the learning needs of different learners. Give examples with respect to gender, inclusion, culture and language.

- Read few diaries written by teachers, analyse their text in the context of teaching activities.

- Interact with few teachers in a nearby school and discuss with them the relevance of training they received with respect to the classroom teaching.

Mode of Examination	Theory		
Weightage Distribution	CA	MTE	ETE
	30%	20%	50%
Text books*	Bhatt, H. *The diary of a school teacher*: An Azim Premji University publication, w.arvindguptatoys.com/arvindgupta /diary - school teacher- eng.pdf. Burden, Paul R; Byrd, David. M. (1999). *Methods for Effective Teaching* (Sec Edition), Allyn and Bacon. Carr, D (2005), *Making Sense of Education: An Introduction to the Philosophy and Theory of Education and Teaching*, Routledge. Delpit, L (2006). *Other People's children, Cultural Conflict in the Classroom.* The New

		press.
		Dhar,T.N. (Ed). 1996.*Professional Status of Teachers*, NCTE, New Delhi.
		Kauchak, D. P and Eggen, P. D (1998). *Learning and Teaching,: Research based Methods*,Boston: Allyn and Bocan
		Ladsen – Billings, G (1995). Toward a Theory of Culturally Relevant Pedagogy.
		American Educational Research Journal, 32 (3), 465-491. Lampert, M. (2001). *Teaching Problems and the Problems of Teaching*. Yale University press.
		NCERT (2005*). National Curriculum Framework,* New Delhi
		Olson, D.R. & Bruner, J.S. (1996). ―Folk Psychology and Folk Pedagogy‖. In D.R. Olson & N. Torrance (Eds.). *The Handbook of Education and Human Development* (PP.9-27). Blackwell.
	Other References	Piaget, J. (1997). ―Development and Learning‖, In M. Gauvain & M. Cole (Eds.), *Reading on the Development of Children*. New York: WH Freeman & Company.
		Shulman,L.S. (1986). Those who understand: Knowledge growth in teaching. *Educational Researcher*, 4-14.
		Vygotsky, L. (1997). ―Interaction between Learning and Development‖, In M.Gauvain & M. Cole (Eds.) *Reading on the Development of Children* , New York: WH Freeman & Company.

SHARDA UNIVERSITY
Beyond Boundaries

BSP211: PHYSICS PRACTICAL

School: SOE	Batch: 2020-24
Program: B.Sc. B.Ed	Current Academic Year: 2021-22
Branch: Education	Semester: III

1	Course Code	BSP 211
2	Course Title	Physics Practical
3	Credits	1
4	Contact Hours (L-T-P)	0-0-2
	Course Status	Co Requisite
5	Course Objectives	1. To explain the variations in Magnetic fields. 2. To explain the Deflection Magnetometer -Tan A, Tan B positions and deflection magnetometer -Tan C Position-moment of moments. 3. To determine resistance & resistivity using Meter Bridge. 4. To determine of frequency of AC mains using Sonometer & electromagnet. 5. To verify the Thevenin's and Norton's theorem.
6	Course Outcomes	
7	Course Description	This course will help the students to understand variation of Magnetic field along the axis of a circular coil, horizontal component of Earth's magnetic field using a Tangent galvanometer and Thevenin's and Norton's theorem.
8	Course Outlines	
	Unit 1	
	A	• To study the variation of Magnetic field along the axis of a circular coil.
	B	• To determine M & H using deflection magnetometer & vibration magnetometer.
	C	• To determine horizontal component of Earth's magnetic field using a Tangent galvanometer. • To calibrate an ammeter using a potentiometer and Daniel cell.
	Unit 2	
	A	• Mapping of magnetic field due to a current carrying straight conductor.
	B	• Determination of resistance & resistivity using Meter Bridge. • Charging & Discharging of a Capacitor.

C	• Deflection Magnetometer -Tan A, Tan B positions. • Deflection magnetometer -Tan C Position-moment of moments.	
Unit 3		
A	• Mapping of magnetic field lines for a current carrying solenoid.	
B	• Searle's vibration magnetometer-moment & ratio of moments. • Box type vibration magnetometer- M &Bh.	
C	• Comparison of emf and determination of internal resistance of a cell using a potentiometer.	
Unit 4		
A	• Determination of resistance & resistivity using PO Box. • Comparison of capacitance by Desauty's bridge using BG.	
B	• Determination of frequency of AC mains using Sonometer & electromagnet.	
C	• Variation of phase angle with capacitance for a RC circuit. • Conversion of Galvanometer to Voltmeter.	
Unit 5		
A	• Unknown resistance by Carey Foster bridge. • Induced emf.	
B	• Maximum power transfer theorem.	
C	• To verify the Thevenin's and Norton's theorem	
Mode of Examination	Jury+Practical+Viva	

Weightage Distribution	CA	MTE	ETE
	60%	0%	40%

Other References	B.L.Flint & H.T.Worsnop, Advanced Practical Physics for students, Asia Publishing House,1971. E Armitage, Practical Physics, John Murray. PSSC Physics Laboratory Guide. S.Panigrahi & B.Mallick, Engineering Practical Physics, Cengage Learning India Pvt. Ltd., 2015 Indu Prakash and Ramakrishna, A Text Book of Practical Physics, 11th Edition, Kitab Mahal, New Delhi, 2011. Jerry D Wilson and Cecilia A. Hernandez-Hall Physics Laboratory Experiments7thEdition, Cengage Learning, 2009. D.P. Khandelwal,A Laboratory Manual of Physics for Undergraduate Classes, Vani Publication, 1985.

BSP212: PHYCOLOGY AND MYCOLOGY LAB

School: SOE	**Batch: 2020-2024**	
Program: B.Sc B.Ed	**Current Academic Year: 2021-22**	
Branch: Education	**Semester: III**	
1	**Course Code**	**BSP 212**
2	**Course Title**	**Phycology and Mycology lab**
3	**Credits**	**2**
4	**Contact Hours (L-T-P)**	**0-0-3**
	Course Status	Compulsory
5	**Course Objective**	1. To train the students in microscopy of thallus structure of fungi and algae 2. To develop understanding of reproductive structures of fungi and algae 3. To learn about stages of cellular processes and cell cycle 4. To understand economic importance of algae and fungi
6	**Course Outcomes**	After finishing the course, the students will be able to- CO1: Understand the morphological characteristics of fungi under microscope CO2: Understand the morphological characteristics of algae under microscope CO3: Appreciate the industrial and social importance of fungi and algae CO4: Comprehend the method of extraction of important biomolecules from fungi and algae CO5: Recollect the methods of algal and fungal culture CO6: Analyze the life cycle stages and structures of fungi and algae
7	**Course Description**	The course gives an insight into the morphology and physiology of selected algae and fungi, their role in the environment, agriculture, biotechnology, industry and disease. It provides a practical foundation for careers in microbiology, food industry, environment and biotechnology.
8	Course Outlines	
	Unit 1	**Experiment related to mycology**
		To examine different species of fungi grown on cultured media under the microscope

		To examine bread mould under the microscope
		To examine mould growing on fruits/vegetables under the microscope
	Unit 2	**Experiment related to fungal characteristics**
		To compare morphological features (microscopic) of different classes of fungi
	Unit 3	**Experiment explaining phycology**
		To examine aquatic algae
	Unit 4	**Experiment demonstrating life cycle of algae**
		To compare morphological features (microscopic) of different classes of algae
	Unit 5	**Experiment demonstrating economically important fungi and algae**
		To examine edible mushroom under the microscope
		To extract economically important pigment from algae
	Mode of Examination	Practical/Viva
	Weightage Distribution	CA	MTE	ETE
		60%	0%	40%
	Text book/s*	Lee, R.E. 2008. Phycology, Fourth Edition, Cambridge University Press, USA.
	Other References	Lab manual

SHARDA UNIVERSITY
Beyond Boundaries

BSP 213: CHEMISTRY PRACTICAL

School: SOE		Batch: 2020-24
Program: B.Sc. B.Ed.		Current Academic Year: 2021-22
Branch: Education		Semester: III
1	Course Code	BSP 213
2	Course Title	Chemistry Practical
3	Credits	1
4	Contact Hours (L-T-P)	0-0-2
	Course Status	Compulsory
5	Course Objectives	1. To develop basic skills in organic synthesis and purification of organic compounds 2. To develop an understanding of different types of organic compounds. 3. To apply basic techniques used in the organic laboratory for preparation and purification of organic compounds. 4. To gain an insight into various techniques of crystallisation and sublimation. 5. To make them learn and apply basic techniques used in the organic laboratory for preparation and purification of organic compounds.
6	Course Outcomes	After the completion of this course, the students will be able to CO1: Detect and identify the organic compounds. CO2: Understanding of different types of organic compounds. CO3: Employ the major techniques used in laboratory for analyses such as melting point and boiling point determination, distillation, crystallization and sublimation. CO4: Learn and apply basic techniques used in the organic laboratory for preparation and purification of organic compounds.
7	Course	This course provides the student with the necessary background to

	Description	understand the chemistry of carbon-containing compounds. It includes a series of experiments that illustrate synthesis, purification and properties of organic compounds.
8	**Course Outlines**	
	Unit 1	
	A	• Determination of melting point of Benzoic acid / cinnamic acid / m – dinitro benzene / pdichlorobenzene • Determination of boiling point of aniline / nitrobenzene / chlorobenzene
	B	• Distillation of water – alcohol mixture using water condenser;
	C	• Distillation of chlorobenzene –nitrobenzene mixture using air-condenser.
	Unit 2	
	A	• Cystallization: Benzoic acid from hot water, naphthalene from ethanol
	B	• Sublimation of camphor / phthalic acid / succinic acid
	C	• Calibration of Thermometer using naphthalene / acetanilide / urea
	Unit 3	**Organic Synthesis**
	A	• Preparation of Iodoform from ethanol / acetone using sodium hypochlorite and KI
	B	• Preparation of m-dinitrobenzene from nitrobenzene by nitration
	C	• Preparation of Acetanilide from aniline by acetylation
	Unit 4	
	A	• Preparation of p-bromoacetanilide from acetanilide by bromination
	B	• Preparation of benzoic acid from benzamide by base hydrolysis.

	C	• Preparation of 2,4,6-tribromo phenol from phenol / 2,4,6-tribromoaniline from aniline
	Unit 5	
	A	• Preparation of aspirin from salicylic acid by acetylation.
	B	• Preparation of o-iodobenzoic acid from anthranilic acid
	C	• Preparation of p-bromoaniline from acetanilide • Preparation of p-nitroacetanilide from acetanilide by nitration
	Mode of Examination	Jury+Practical+Viva
	Weightage Distribution	CA	MTE	ETE
		60%	0%	40%
	Text books*	• A Text Book of Qualitative organic Analysis, A .I . Vogel

BSP214: NON-CHORDATES LAB

School: SOE	Batch: 2020-24
Program: B.Sc. B.Ed.	Current Academic Year: 2021-22
Branch: Education	Semester: III

1	Course Code	BSP214
2	Course Title	Non-Chordates Lab
3	Credits	2
4	Contact Hours (L-T-P)	0-0-3
	Course Status	Co Requisite
5	Course Objective	1. To appreciate the range and diversity of organisms within non-Chordata. 2. To learn the distinguishing characteristics of various phylum. 3. To become skilled in the use of a dichotomous key to identify animal specimens. 4. To design your own dichotomous key. 5. 5. To get a complete knowledge about various species that comes under invertebrates.
6	Course Outcomes	After the successful completion of this course students will be able to: CO1: Know the characteristic features of Porifera and Coelenterata. CO2: Understand the characteristic features of Platyhelminthes and Aschelminthes. CO3: Learn about the characteristics of Annelida. CO4: Get complete understanding about species Arthropoda. CO5: To understand the salient features of Mollusca and Echinodermata. CO6: To get a complete knowledge about various species that comes under invertebrates.
7	Course Description	The aim of this course is to provide better understanding about different species invertebrates. The student gets acquainted with various

		characteristic features of non-chordates along with zoogeographical distribution across the world.
8	**Course Outlines**	
	Unit 1	**General survey of invertebrates through charts/specimens, slides and e-resources**
	a, b	**Porifera** – Specimen studies: Sycon, Spongilla; Permanent Slides: T.S. and L.S. of Sycon
	C	**Coelentrata -** Specimen studies: Hydra, Rhizostoma, Obelia; Permanent Slides: T.S. and L.S. of Hydra
	Unit 2	
	a, b	**Platyhelminthes –** Specimen studies: Fasciola, Taenia solium; Permanent Slides: Redia and cercaria larva of Fasciola hepatica.
	C	**Aschelminthes– Specimen** studies: Ascaris, Wuchereriabancrofti
	Unit 3	
	a, b, c	**Annelida –** Specimen studies: Hirudinaria, Earthworm, Nereis; Permanent Slides: T.S. of Earthworm through 12th and 18th segment; T.S. of Hirudinaria through crop with and without diverticula
	Unit 4	
	a, b, c	**Arthropoda -** Specimen studies: Cancer, Melanopus, Millipede, Mouth parts of Cockroach
	Unit 5	
	a, b	**Mollusca –** Pila globosa, Octopus
	C	**Echinodermata –** Asrerias, Permanent Slides: Bipinnaria larva, Brachiolaria larva
	Mode of Examination	Practical/Viva

Weightage Distribution	CA	MTE	ETE
	60%	0%	40%

Text book/s*	1. Verma, Prem Singh. *A Manual of Practical Zoology: Invertebrates*. S. Chand Publishing, 2000.
Other References	• Practical Invertebrate Zoology; a Laboratory Manual for the Study of the Major Groups of Invertebrates, Excluding Protochordates by Rodney Phillips, And Cox, Francis Edmund Dales • 2. Practical Zoology Invertebrate by Dr. S.S. Lal

BSP215: SCHOOL ATTACHMENT PROGRAMME & COMMUNITY LIVING

School: SOE	**Batch: 2020-2024**	
Program: B.Sc .B.Ed.	**Current Academic Year: 2021-22**	
Branch: Education	**Semester: III**	
1	**Course Code**	**BSP215**
2	**Course Title**	**School Attachment Programme & Community Living**
3	**Duration**	2 weeks
4	**Credits**	2
5	**Contact Hours (L-T-P)**	0-0-0
6	**Course Type**	Pre-Requisite
7	**Course Objectives**	The course will enable the student-teachers to– 1. Understand and analyse the functioning of various curricular activities, e.g. sports and games, dance, songs; organized in the school and 2. Understand the perception and role of community members in teaching learning environment.
8	Course Outcomes	After the completion of the Course the student teacher will be able to- CO1. Understand and analyse the functioning of various curricular activities, e.g. sports and games, dance, songs; organized in the school and CO2. Observe and take experience of teaching-learning process in the classroom. CO3. Apply the school experiences in their teaching profession to increase efficiency. CO4-Understand the perception and role of community members in teaching learning environment.
9	**Course Description**	This course helps the students to understand the functioning of various curricular activities in the school and the relationship between school and society.
	A	**School Attachment Programme** Duration: 1 week

		One-week School Attachment Programme shall be carried out during the second semester in local/nearby school (s). The students will be allotted schools in the vicinity of the university. Care will be taken to identify various types of school for the programme, e.g. Government, Private, Urban, Rural, and Special Schools. During this programme, the student-teachers shall observe: (i) various curricular activities, e.g. sports and games, dance, songs; and (ii) the teaching-learning process in the classroom, ICT use, student participation, classroom management. The student-teachers shall observe curricular activities for which they may use observation schedules. The institute shall develop these schedules; and orient the student-teachers on the process of observation as well as use of the schedules. At the end of the programme, student-teachers shall be required to develop a detailed report and share the same in a seminar/meeting at the Institute.
	B	**Community Living** Duration: 1 week Student-teachers shall be provided exposure to community life for at least one week during which they shall spend time with the community members and act in terms of preparing school development plan, sharing cultural practices, holding cultural programmes and gaining community 's perception about and aspirations from formal education system. At the end of this programme, the student-teachers shall prepare a detailed report of the programme, individually and/or in group.

SHARDA UNIVERSITY
Beyond Boundaries

SEP 101: EPC 1: READING AND REFLECTING ON TEXT

School: SOE	**Batch: 2020-24**	
Program: B.Sc .B.Ed.	**Current Academic Year: 2021-22**	
Branch: Education	**Semester: III**	
1	**Course Code**	**SEP 101**
2	**Course Title**	**Reading and Reflecting on Text**
3	**Credits**	2
4	**Contact Hours (L-T-P)**	0-0-3
	Course Type	Co Requisite
5	**Course Objectives**	The course will enable the student-teachers - 1. To develop reflective thinking on different aspects of reading. 2. To sharpen the reading skills among the students 3. To reflect on the ideas expressed in the texts. 4. To Plan, draft, edit and present a piece of writing related to their understanding of a text. 5. To Develop study and references skills 6. To enhance the critical analysis skill of reading materials 7. To develop proficiency in reading and responding to written texts. To examine and appreciate authentic literary and non-literary texts.
6	**Course Outcomes**	On the completion of this course, the pupil-teachers will be able to- CO-1. Develop interest for reading among learners CO-2. Read for comprehending ideas, reflect and think on different types of texts CO-3. Appreciate different kinds of writings in different contexts. CO-4. Facilitate self-learning, reflection and ability to express. CO-5. Develop different types of reading skills through various activities and apply different levels, types, techniques and methods of reading CO-6. Analyze different ways of analysing reading materials
7	**Course Description**	A number of studies have shown that the teachers as well as student-teachers do not read books other than the textbooks they have to teach or the books related to the syllabi of the course they are pursuing. As the goal of any teacher education programme is to prepare teachers as reflective practitioners. One of the strategies to

		achieve this goal could be to provide opportunities to the student-teachers to read the given texts and them to the critically examine the ideas presented in the texts and organize debates/discussions around the ideas. The given texts could be extracts from short stories, novels, biographies, autobiographies, literary essays or educational, philosophical, psychological and sociological texts. The teachers will select 10-15 books available in their library for teaching the course in the light of its objectives listed below.
8		
	Unit 1	**One or more stories from the following collection**
	A	• How I Taught My Grandmother to Read and other Stories- Sudha Murthy- Puffin. Books, 2004 • Tales from the Indian Jungle-Kenneth Anderson- Rupa& Co.2001 • Tales of the Open Road- Ruskin Bond- PenguinUK-2006 Encounters with Animals- Gerald Durrel-Penguin 2012
	B	Excerpts from the following- • The Diary of a Young Girl: Anne Frank, Random House. • The man who planted trees- Jean Giono, Chelsea Green Pub. • 'I have a Dream 'Texts of speech delivered on Aug 28, 1963-Martin Luther King (Text and You tube version available.)
	Unit 2	**Essays /Excerpts from Literary Texts**
	A	• The Elephant, the Tiger and the Cellphone- Shashi Tharoor, Penguin, India. • Nine Lives- In Search of the Sacred in Modern India- William Dalrymple, Bloomsbury, London.
	B	• Interpretor of Maladies – (Title Story) – Jhumpa Lahari, Mariner Books. • Running in the Family- Michael Ontage, Bloomsbury, London.
	Unit III:	**Essays /Excerpts from Educational and Scientific Texts**
	A	• Medium of education (The selected works of Gandhi- Vol.6), Navajeevan Publication. • Democracy and Education (Ch -Thinking in Education)-John Dewey,

		Emereo Publ.
		• Pedagogy of the Oppressed (Critical Pedagogy), Paulo Freire, Bloomsbury.
		A Brief History of Time- Stephen Hawking, Random House.
	B	• Fall of a Sparrow- Salim Ali,Oxford.
		• Education and world peace. In Social responsibility, (Krishnamurti, J.) Krishnamurti Foundation.
		• National curriculum framework – 2005, NCERT
		RTE Act, 2009.
	Transaction Mode	A response-based approach will be followed where students are regarded as active meaning makers whose personal experience will be tapped for the interpretation of the text. Students as readers and writers will participate in the constructive reading- writing process. Seminars and open forums will accompany the discussion of texts.
	Mode of Examination	Practical

		CA	MTE	ETE
	Weightage Distribution	60%		40%

Text books*	• How I Taught My Grandmother to Read and other Stories- Sudha Murthy-Puffin. Books, 2004
	• Tales from the Indian Jungle-Kenneth Anderson- Rupa& Co.2001
	• Tales of the Open Road- Ruskin Bond- PenguinUK-2006
	• Encounters with Animals- Gerald Durrel-Penguin 2012
	• The Diary of a Young Girl:Anne Frank, RandomHouse.
	• The man who planted trees- Jean Giono, Chelsea GreenPub.
	• 'I have a Dream 'Texts of speech delivered on Aug 28, 1963-Martin Luther King (Text and You tube versionavailable.)
	• The Elephant, the Tiger and the Cellphone- ShashiTharoor, Penguin,India.
	• Nine Lives- In Search of the Sacred in Modern India- William Dalrymple, Bloomsbury, London.

		• Running in the Family- Michael Ontage, Bloomsbury,London.
		• Interpretor of Maladies – (Title Story) - JhumpaLahari, MarinerBooks
	Other References	• Medium of education (The selected works of Gandhi- Vol.6), Navajeevan Publication.
		• Democracy and Education (Ch -Thinking in Education)-John Dewey, Emereo Publ.
		• Pedagogy of the Oppressed (Critical Pedagogy), Paulo Freire,Bloomsbury.
		• A Brief History of Time- Stephen Hawking, Random House.
		• Fall of a Sparrow- Salim Ali, Oxford.
		• Education and world peace. In Social responsibility, (Krishnamurti, J.) Krishnamurti Foundation.
		• National curriculum framework – 2005, NCERT RTE Act, 2009.

Note- 1. MOOCs-SWAYAM -Maths /Zoology (Credits-3)

    2.Open Elective – Offered by the University (Credits-4)

.

SEMESTER IV

BSI 210: OPTICS

School: SOE	**Batch: 2020-24**	
Program: B.Sc. B. Ed.	**Current Academic Year: 2021-22**	
Branch: Education	**Semester: IV**	
1	**Course Code**	**BSI 210**
2	**Course Title**	**OPTICS**
3	**Credits**	4
4	**Contact Hours (L-T-P)**	4L+ 0T +0P
	Course Status	Core
5	**Course Objectives**	1. Develop an understanding about the nature of light 2. Apply the understanding of wave phenomenon to light. 3. Gain an insight into the phenomena related to wave nature of light. 4. Demonstrate an understanding of the application of waves in optics 5. Acquire the knowledge about diffraction and Fresnel's diffraction and their applications
6	**Course Outcomes**	After the completion of this course, the student will be able to- CO1: discuss the various theories of light, phenomenon of scattering of light. CO2: explain the Raman effect and its applications CO3: discuss theory of interference, wavelength of light and refractive index of thin films CO4: explain in detail Fraunhofer's' diffraction and Fresnel's diffraction and their applications CO5: understand the concept of polarization and the use of polaroid sheets. CO6: Demonstrate an understanding of the application of waves in optics CO7: Explain certain phenomena related to wave nature of light.

7	Course Description	Optics is primarily a theoretical course with some application to optical design. The course focuses on physical optics including the Fresnel Laws of refraction and reflection, interference, Fourier analysis and diffraction. A short discussion of geometrical optics will also be included.	
8	Course Outlines		
	Unit 1	NATURE OF LIGHT AND SCATTERING	
	A	• Brief discussion on theories of light. Dual nature of electromagnetic radiation, electromagnetic spectrum, energy and momentum of electromagnetic wave. Electromagnetic nature of light. Definition and Properties of wave front. Huygens Principle.	
	B	• A brief discussion on Tyndall, Rayleigh and Raman scattering of light. A qualitative account of fluorescence and phosphorescence,	
	C	• The Raman Effect experiment and its explanation, intensity and polarisation of Raman lines, some applications of Raman Effect.	
	Unit 2	INTERFERNCE	
	A	• Definition of Coherence, Methods of production of Coherent sources by division of wavefront and division of amplitude. Theory of interference (condition for constructive and destructive interference).	
	B	• Young's double slit experiment and Fresnel's Bi-prism. Interference in Thin Films: parallel and wedge-shaped films. Newton's Rings: measurement of wavelength and refractive index.	
	C	• Michelson interferometers: determination of wavelength of light.	
	Unit 3	FRAUNHOFER'S DIFFRACTION	
	A	• Fraunhofer Diffraction, Diffraction at a single slit, double slit, multiple slits, Diffraction Grating.	
	B	• Resolving power – Rayleigh's criterion, resolving power of a grating and telescope.	
	C	• Resolving power – Rayleigh's criterion, resolving power of a grating	

		and telescope.
Unit 4		**FRESNEL'S DIFFRACTION**
A		• Fresnel diffraction, half period zone, zone plate.
B		• Diffraction at a circular aperture and at a straight edge, a slit and a wire using half-period zone analysis.
C		• Diffraction at a circular aperture and at a straight edge, a slit and a wire using half-period zone analysis.
Unit 5		**POLARIZATION**
A		• Polarization by reflection, Brewster's law, Malus law, Double refraction, Production and detection of linearly, circularly and elliptically polarized light
B		• Quarter and half wave plates, Polaroid. • Discussion on use of Polaroid sheets in preparing tinted sunglasses.
C		• Optical activity, Fresnel's theory, Rotatory polarization, use of biquartz.
Mode of Examination		Theory

Weightage Distribution	CA	MTE	ETE
	30%	20%	50%

Other References	• F A Jenkins and H E White, Fundamentals of Optics, McGraw-Hill, 1976. • B.K. Mathur, Principles of Optics, Gopal Printing, 1995. • H.R. Gulati and D.R. Khanna, Fundamentals of Optics, R. Chand, 1991. • Eugene Hecht,Optics, Pearson Education India, 2012. • N. Subramaniam, Brijlal, and M. N. Avadhanulu Textbook of Optics, S. Chand Limited, 2004. • A K Ghatak, Optics, Tata McGraw-Hill Education, 2009. • 7. Ariel Lipson,Stephen G. Lipson, Henry Lipson, Optical Physics, Cambridge University Press, 2010.

BSI 211: DEVELOPMENTAL BIOLOGY OF ANGIOSPERMS

School: SOE	Batch: 2020-24
Program: B.Sc. B.Ed.	Current Academic Year:2021-22
Branch: Education	Semester: IV

1	Course Code	BSI 211
2	Course Title	Developmental Biology of Angiosperms
3	Credits	4
4	Contact Hours (L-T-P)	4-0-0
	Course Status	Core
5	Course Objective	1. To know about the structure of angiosperm plant. 2. To develop knowledge of development of an Angiosperm plant. 3. To acquaint the students about the Development of Male gametophyte. 4. To give students a thorough understanding of various developmental processes of reproductive organs and embryo. 5. To help the students understand Embryonic Development.
6	Course Outcomes	After the completion of the course students will be able to- CO1: Describe anther structure and dehiscence. CO2: Explain ovule structure and types. CO3: List anatomical details and types of reproductive organs CO4. Discuss various developmental stages of embryo development in an Angiosperm CO5. Identify Pollination mechanisms and types
7	Course Description	This course is designed to impart knowledge of anatomical details and types of reproductive organs and various developmental stages of embryo development in an Angiosperm.
8	Course Outlines	
	Unit 1	Angiosperm flower

	A	History of reproductive biology of Angiosperms (contributions of G.B. Amici; W. Hofmeister; E. Starsburger; S.G. Nawaschin; P. Maheshwari; B.M. Johri; W.A. Jensen; J Heslop-Harrison);
	B	Typical Angiosperm flower, classification of flower on the basis of number and arrangement of stamens and petals;
	C	Basic structure of androecium and gynoecium.
	Unit 2	**Development of Male gametophyte**
	A	Anther wall layers, Tapetum-types, & functions; Microsporogensis: Pollen wall proteins;
	B	Development of male gametophyte; male germ unit; Callose deposition in anther and its significance;
	C	Abnormal features: Pseudomonads, polyads, massulae, pollinia
	Unit 3	**Development of Female gametophyte**
	A	Ovule structure (function of synergids; antipodals; polar nuclei) and types; Special structures- endothelium, obturator, aril, caruncle, and hypostase;
	B	Placentation-definition and types; Megasporogenesis (monosporic, bisporic and tetrasporic condition);
	C	Organization and ultrastructure of mature embryo sac
	Unit 4	**Pollination in Angiosperms**
	A	Pollination- concept and modes of pollination
	B	Pollination types
	C	Significance of pollination
	Unit 5	**Fertilization**
	A	Concept of fertilization - Germination of pollen on stigma and growth of pollen tube through style (solid and hollow styles), entry of pollen tube into ovule (porogamy, mesogamy, chalazogamy);
	B	Double fertilization and its significance; Triple fusion.
	C	Basic concepts of Self Incompatibility- Gametophytic and Sporophytic incompatibility.
	Mode of Examination	Theory

Weightage Distribution	CA	MTE	ETE
	30%	20%	50%
Text book/s*	The Embryology of Angiosperms. 6th Edition. Bhojwani SS, Bhatnagar SP, Dantu PK. Vikas Publishing House Pvt Ltd		
References	• Bachelier JB, Friedman WE (2011) Female gamete competition in an ancient angiosperm lineage. Proc Natl Acad Sci U S A 108:12360–12365. • Vialette-Guiraud ACM, Chauvet A, Gutierrez-Mazariegos J, Eschstruth A, Ratet P, Scutt CP (2016b) A conserved role for the NAM/miR164 developmental module reveals a common mechanism underlying carpel margin fusion in monocarpous and syncarpous eurosids. Front Plant Sci 6:1239 • Alessa L, Kropf D L. F-actin marks the rhizoid pole in living Pelvetia compressa zygotes. Development. 1999; 126:201–209		

BSI212: THERMODYNAMICS, EQUILIBRIUM AND SOLUTIONS

School: SOE		**Batch: 2020-24**
Program: B.Sc.B.Ed		**Current Academic Year: 2021-22**
Branch: Education		**Semester: IV**
1	**Course Code**	**BSI 212**
2	**Course Title**	**Thermodynamics, Equilibrium and Solutions**
3	**Credits**	4
4	**Contact Hours (L-T-P)**	4L+ 0T +0P
	Course Status	Core
5	**Course Objectives**	1. To know about the structure of angiosperm plant 2. To develop knowledge of development of an Angiosperm plant 3. To acquaint the students about the Development of Male gametophyte 4. To give students a thorough understanding of various developmental processes of reproductive organs and embryo. 5. To help the students understand Embryonic Development.
6	**Course Outcomes**	After the completion of this course, the student will be able to CO1: understand the concept of conservation of energy and its role in various thermochemical equations. CO2: explain the origin of the driving force of physical and chemical changes and evolution of second law of thermodynamics and related concepts. CO3: understand the concept of phase equilibrium and the factors affecting it, CO4: apply the concept of equilibrium to construct and interpret the phase diagrams. CO5: understand and explain the colligative properties and the laws associated with solutions and the behaviour of immiscible liquids.
7	**Course Description**	The present course aims to establish the general thermodynamics principles and key relations that are essential to describe the energy transfer processes. The main elements include the laws of thermodynamics, mathematical description of phase equilibria and properties of solutions.

8	Outline Syllabus	
Unit 1	**Thermodynamics – I**	
A	• Concept of Energy, Historical perspectives, Generalisation of laws of Thermodynamics based on human experience with Nature and natural Processes. • Language of thermodynamics: system, surroundings, etc. Types of system, intensive and extensive properties. State and path functions and their differentials. • Thermodynamic process: Concept of heat and work.	
B	• First Law of Thermodynamics: Statement, definition of internal energy and enthalpy • Heat capacity, heat capacities at constant volume and pressure and their relationship • Joule, Joule–Thomson coefficient and inversion temperature. • Calculation of w.q. dU and dT for the expansion of ideal gases under isothermal and adiabatic conditions for reversible process.	
C	• Thermochemistry: Standard state, standard enthalpy of formation. Hess's Law of heat summation and its applications. Heat of reaction at constant pressure and at constant volume. Enthalpy of neutralization. Bond dissociation energy and its calculation from thermochemical data, temperature dependence of enthalpy, Kirchhoff's equation.	
Unit 2	**Thermodynamics – II**	
A	• Discussion of experiential knowledge to account for the spontaneity in changes around us. Need for the Second law of thermodynamics, different statements of the law, Carnot cycle and its efficiency, Carnot theorem, Thermodynamic scale of temperature.	
B	• Concept of Entropy: Entropy as a state function, entropy as a function of V & T, entropy as a function of P & T, entropy change in physical changes, Clausius inequality, entropy as a criterion of spontaneity and equilibrium.	

		Entropy changes in ideal gases and mixing of gases.
	C	• Gibbs and Helmholtz functions: Gibbs function (G) and Helmholtz function (A) as thermodynamic quantities. A and Gas criteria for thermodynamic equilibrium and spontaneity, their advantage over entropy change. Variation of G and A with P, V and T. • Third law of thermodynamics: Nernst heat theorem, statement and concept of residual entropy, evaluation of absolute entropy from heat capacity data.
Unit 3		**Chemical Equilibrium and Phase Equilibria**
	A	• Recognising a system at Chemical Equilibrium. Attributes of Chemical Equilibrium, Thermodynamic derivation of law of mass action, Equilibrium constant and free energy. • Factors that affect the chemical equilibrium and Le Chatelier's principle.
	B	• Calculations involving equilibrium constant Ionic equilibria in aqueous solutions, sparingly soluble salts, solubility product common ion effect, selective precipitation, applications in qualitative analysis. • Ionisation of water, pH scale, weak acids and bases, hydrolysis, buffer solutions, acid base indicators, acid base titrations and multi stage equilibria.
	C	• Reaction isotherm and reaction isochore to establish a systematic way of discussing the changes systems undergo when they are heated and cooled and when their composition is changed.
Unit 4		**Chemical Equilibrium and Phase Equilibria**
	A	• Clapeyron equation and Clausius –Clapeyron equation, applications. • Statement and meaning of the terms–phase, component and degree of freedom, derivation of Gibbs phase rule, phase equilibria of one component system–water, CO_2 and Sulphur systems.

B		• Phase equilibria of two component system–solid-liquid equilibria–simple eutectic–Bi–Cd. Pb-Ag Systems, desilverisation of lead. Simple eutectics, systems forming compounds with congruent melting points.
C		• To unify the equilibrium properties of simple mixtures on the basis of chemical potential. Solutions of Gases in liquids. Henry's law and its applications, solutions of solids in liquids. Distribution law, application of distribution law to association, dissociation and extraction.
Unit 5	**Solutions**	
A		• Dilute Solution: Colligative properties, Osmosis, Osmotic pressure, Vant Hoff Theory, Lowering of Vapour Pressure, Depression in Freezing point and Elevation in Boiling Point, Vant Hoff Factor.
B		• Solid solutions – compound formation with congruent melting point (Mg – Zn) and incongruent melting point (NaCl– H_2O), ($FeCl_3$–H_2O) and ($CuSO_4$–H_2O) system. Freezing mixtures, acetone dry ice.
C		• Liquid – liquid mixtures: Ideal liquid mixtures, Raoult's and Henry's law. Non-ideal system – Azeotropes–HC– H_2O and ethanol–water systems. • Partially miscible liquids– Phenol-water, trimethylamine– water, nicotine–water systems. Lower and upper consolute temperature. Effect of impurity on consolute temperature. Immiscible liquids, steam distillation. Nernst distribution law – thermodynamic derivation, applications.

Mode of Examination	Theory		
Weightage Distribution	CA	MTE	ETE
	30%	20%	50%
Text books*	•		
Other References	1. Principles of physical chemistry: Puri,Sharma and Pathania, 47th edition 2. Physical Chemistry: Atkins 3. Phase rule: Gurdeep Raj, Goel Publishing house.		

BSI 213: DIFFERENTIAL EQUATIONS

School: SOE	Batch: 2020-24
Program: B.Sc.B.Ed.	Current Academic Year: 2021-22
Branch: Education	Semester: IV

1	Course Code	BSI 213
2	Course Title	Differential Equation
3	Credits	5
4	Contact Hours (L-T-P)	4-1-0
	Course Status	Core
5	Course Objectives	1. Develop an understanding of partial differential equations, 2. Make use of these equations in solving real life problems. 3. Acquaint themselves Homogeneous linear equations with constant coefficients, 4. Find rules for finding the complementary functions, 5. Find rules for finding the particular integral, Separation of variables.
6	Course Outcomes	The students will be able to CO1 Understand the partial differential equations. CO2 Explain the equations in solving real life problems. CO3 Analyses the homogeneous linear equations with constant coefficients. CO4 Describe the rules for finding the complementary functions. CO5 Explain rules for finding the particular integral, Separation of variables.
7	Course Description	This course will help the students to understand the partial differential equations, Homogeneous linear equations with constant coefficients, rules for finding the complementary functions and rules for finding the particular integral, Separation of variables.
8		

	Unit 1	Unit I: Differential calculus:
	A	Limits revisited, Continuous functions, Discontinuous functions and types.
	B	Differentiation, Higher derivatives, Leibnitz•fs theorem. Monotone functions.
	C	Maxima and Minima, Concavity, Convexity and Points of inflection.
	Unit 2	Unit II
	A	Differentiability theorems, Rolle•fs theorem
	B	Mean Value theorems, Taylor•fs theorem, Maclaurin•fs theorem.
	C	Taylor•fs and Maclaurin•fs infinite series, Indeterminate forms.
	Unit 3	
	A	The integral of a function, Techniques of integration, Integration of Rational Functions, Rationalizable Integrals.
	B	Definite Integral, Properties, Definite integral as the limit of a sum, The fundamental theorem of Calculus, Reduction formulae.
	C	Area, Volume and Length.
	Unit 4	**Matrices-I**
	A	Matrices of order mXn, Algebra of matrices, Symmetric and Skew Symmetric, Hermitian and
	B	Skew Hermitian matrices and their standard properties, Determinants. Adjoint of a square matrix, Singular and non-singular matrices, Rank of a matrix, Elementary row / column operations.
	C	Invariance of rank under elementary operations, Inverse of a non-singular matrix by elementary operations.
	Unit 5	**Matrices – II**
	A	System of m-linear equations in n-unknowns, Matrices associated with linear equations,
	B	Trivial and non-trivial solutions, Criterion for existence of non-trivial solution of homogeneous and non- homogeneous systems and their uniqueness

C	Characteristic equation of a square matrix, Eigen values and Eigen vectors. inding a real symmetric matrix, Diagonalization of a real symmetric matrix, Cayley. Hamilton.	

Mode of Examination	Theory		
Weightage Distribution	CA	MTE	ETE
	30%	20%	50%

Text books*	- Theorem and its applications. - Paul Blanchard, Robert L. Devaney, Glenn R. Hall, *Differential Equations (Preliminary Edition)*,PWS Publishing, Boston, 1996. - William H. Boyce and Richard C (1996)Diprima, *Elementary Differential Equations and Boundary Value Problems (6th Edition),* Wiley, New York. - C.H. Edwards, Jr., David E. Penney, (1996) *Elementary Dfifferential Equations with Applications (Third Edition),* Prentice-Hall, Englewood Cliffs, NJ. R. Kent Nagle and Edward B. Saff, (1993) *Fundamentals of Differential Equations (Third Edition),* Addison Wesley, Reading, MA.

BSI 214: DIVERSITY OF CHORDATES

School: SOE	Batch: 2020-24
Program: B.Sc. B.Ed.	Current Academic Year: 2021-22
Branch: Education	Semester: IV
1	Course Code	BSI 214
2	Course Title	Diversity of Chordates
3	Credits	4
4	Contact Hours (L-T-P)	4-0-0
	Course Status	Core
5	Course Objective	1. To understand about chordates and their general characteristics. 2. To understand the level of organization in different chordate species. 3. To understand the origin and evolutionary relationship in different class of chordates.
6	Course Outcomes	After the successful completion of this course students will be able to: CO1: Helps in understanding salient features of hemichordates and protochordates. CO2: To understand the origin of chordates and characteristic features of cyclostomes. CO3: To learn about origin of tetrapoda and general characteristics of amphibians and reptiles up to order. CO4: To learn about aves and mammals with special emphasis on important features. CO5: To understand about the different geographical realms and theories regarding animal distribution. CO6: To get a complete knowledge about chordates and brief idea about the evolution of animal species along with their distribution.

7	Course Description	The 'Diversity of Chordates' course provides deeper knowledge about general characteristics of chordates along with origin of different classes. The important and special characteristics of each class has been discussed in more detail. The course also provides brief knowledge about distribution of animals.
8	**Outline syllabus**	
	Unit 1	**Introduction to chordate and Protochordata**
	A	General characteristics and Classification of chordates
	B	General characters of Hemichordata, and Urochordata
	C	Larval forms in protochordates, Retrogressive metamorphosis in Urochordata
	Unit 2	**Origin of chordates, Agnatha and Pisces**
	A	Dipleurula concept and Echinoderm theory of origin of chordates
	B	Advanced features of vertebrates over protochordata
	C	General characteristics of cyclostomes, Osmoregulation and parental care in fishes
	Unit 3	**Amphibians and Reptilia**
	A	Origin of *Tetrapoda*;
	B	General characteristics and classification up to classes in amphibians, Parental care in Amphibians
	C	General characteristics and classification up to order in reptilia; Poison apparatus and Biting mechanism in snakes
	Unit 4	**Aves**
	A	General characteristics of Aves; *Archaeopteryx*-- a connecting link
	B	Classification up to order in Aves; *Archaeopteryx*-- a connecting link
	C	Flight adaptations and migration in birds
	Unit 5	**Mammals**
	A	General characters of mammalia

	B	classification up to order in mammalia
	C	Locomotory appendages in mammalia

	Mode of examination	Theory		
	Weightage Distribution	CA	MTE	ETE
		30%	20%	50%

	Textbook/s*	1. Cleveland P. Hickman, Jr., Larry S. Roberts, Allan Larson (2003). Animal Diversity. 3rd Edition. McGraw−Hill
	Other References	1. Kotpal, R. L. Modern Textbook of Zoology: Vertebrates. Rastogi Publications, 2012. 2. Purves et al: Life-the Science of Biology, (7thed. 2004, Sinauer) 3. Parker &Haswell: Textbook of Zoology, Vol. II (2005, Macmillan)

BSI 215: LINEAR ALGEBRA

School: SOE	Batch: 2020-24
Program: B.Sc. B.Ed.	Current Academic Year: 2021-22
Branch: Education	Semester: IV

1	Course Code	BSI 215
2	Course Title	Linear Algebra
3	Credits	2
4	Contact Hours (L-T-P)	2-0-0
	Course Status	DSE
5	Course Objectives	1. Understand the concepts in linear algebra. 2. Identify linear operations, implement them as matrices in a given basis, and compute compositions and solutions to equations using matrix algebra. 3. Identify and describe subspaces associated to linear transformations of vector spaces. 4. Apply the concepts of linear algebra in solving appropriate problems. 5. Find eigenvectors and calculate eigenvalues of matrices in some settings.
6	Course Outcomes	The students will be able to CO1: Solve linear systems of equations by appropriate matrix operations on matrices of coefficients and augmented matrices. CO2: Describe linear transformations algebraically and geometrically when given either description. CO3: Identify linear operations, implement them as matrices in a given basis, and compute compositions and solutions to equations using matrix algebra. CO4: Identify and describe subspaces associated to linear transformations of vector spaces. CO5: Find eigenvectors and calculate eigenvalues of matrices in some settings.

7	**Course Description**	This course covers matrix theory and linear algebra, emphasizing topics useful in other disciplines. Linear algebra is a branch of mathematics that studies systems of linear equations and the properties of matrices. The concepts of linear algebra are extremely useful in physics, economics and social sciences, natural sciences, and engineering. Due to its broad range of applications, linear algebra is one of the most widely taught subjects in college-level mathematic.
8		
	Unit 1	
	A	Vector spaces, Subspaces,
	B	Linear Combinations, Linear span, Linear dependence and Linear independence of vectors,
	C	Basis and Dimension, Finite dimensional vector space – some properties
	Unit 2	**Unit II:**
	A	Quotient spaces, Homomorphisms and Isomorphisms of vector spaces, ,
	B	Direct sums Inner product spaces
	C	Euclidean vector spaces, Distance, Length, Properties,
	Unit 3	
	A	Cauchy-Schwarz inequality, Orthogonal and orthonormal vectors, Gram Schmidt Orthogonalization Process.
	B	Matrices of Linear maps, Change of basis and the effect of associated matrices,
	C	Kernel and Image of a linear transformation,
	Unit 4	
	A	Rank and Nullity theorems
	B	Singular and non-singular linear transformations,
	C	Elementary matrices and transformations,
	Unit 5	

A	Similarity transformation, Eigen values and Eigen vectors,	
B	. Diagonalisation, Characteristic polynomial,	
C	Cayley - Hamilton Theorem, Minimal Polynomial	

Mode of Examination	Theory		
Weightage Distribution	CA	MTE	ETE
	30%	20%	50%

References-	
	• Calculus by Anton, Addison-Wiley.
	• First Course in Calculus, Serge Lang, Addison-Wiley
	• Calculus by Lipman Bers, Vols. 1 and 2, IBH.
	• Advanced Calculus, Frank Ayres, Schaum Publishing Co.
	• Higher Algebra by Bamard and Child, MacMillan India Ltd.
	• Integral Calculus by Shanthinarayan, S.Chand and Co.Ltd.
	• Differential Calculus by Gorakhprasad, Pothishala Ltd.
	• Calculus and Analytical Geometry by Thomas . Finney, Narosa Publishing House.
	• Algebra by Natarajan, Manicavachagon Pillay and Ganapathy, S. Vishwanath Pvt. Ltd.
	• Matrices by Frank Ayres, Schaum Publishing Co.
	• Textbook of Matrix Algebra by Suddhendu Biswas.

SHARDA UNIVERSITY
Beyond Boundaries

SEB 108: KNOWLEDGE, DISCIPLINES AND SCHOOL SUBJECTS

School: SOE	Batch: 2020—2024
Program: B.Sc. B.Ed.	Current Academic Year: 2021-22
Branch: Education	Semester IV

1	Course Code	SEB 108
2	Course Title	Knowledge, Disciplines and School Subjects
3	Credits	3
4	Contact Hours (L-T-P)	3-0-0
	Course Type	Core
5	Course Objectives	The course will enable the people -teachers to - 1.To enable students to analyze the structure of knowledge as reflected in disciplinary streams and subjects; 2. To enable students to notice the links between disciplines and school subjects 3. To examine the structure of the school curriculum from the primary to the secondary stages in terms of the underlying structure of knowledge; 4. To encourage students to reflect on their own education and notice how their interests and capacities have been shaped by the structure of curriculum and other external factors. 5. To enable the students to reflect on their experiences.
6	Course Outcomes	On the completion of this course, the pupil-teachers will be able to- CO-1. Explain the concept and meaning of knowledge, school subjects, and Academic Disciplines. CO-2. Identify and clarify the relationship between school subjects and academic disciplines. CO-3. Analyze the school curriculum stages in terms of the underlying

			structure of knowledge. CO-4. Analyze the factors that have impacted and consequently paved the way for their preference of particular subjects and disciplines. CO-5. Reflect and appreciate the role played by external agencies in enhancing their capacities and curriculum development. CO-6. Reflect and record their experience on the above.
7	**Course Description**		Knowledge Understanding Disciplines and Subjects is one of the core courses of B.Ed. Program. From time-to-time numerous reports on the school and teacher education program have highlighted the need for school teachers to consider the experiences of different disciplines. It is equally important for teachers to understand how knowledge within and among the disciplines are framed; nature of content included in the school curriculum, and the pedagogical strategies to transact school curriculum.
8	**Course outlines**		
	Unit 1	**Introduction**	
	A	Key question: 'Why does knowledge need to be classified?'; Introduction to epistemology; Knowledge, curiosity and inquiry;	
	B	Knowledge as a system: the role played by our concept of knowledge in shaping our teaching and learning practices.	
	C	Disciplinary streams: their historical origins and evolution; the problem of classifying them; levels of classification, e.g. 'Science' and 'Arts'; 'Humanities' and 'Social Science'.	
	Unit 2	**Streams and Subjects**	
	A	Nature of knowledge (i.e. ways of knowing and bodies of knowledge) placed under distinct disciplinary streams: Science, Social Science, Language, Mathematics; interrelationships among streams; overlaps and gaps in different kinds of classification; the idea of 'subjects' to be learnt at school; Distinct pedagogical demands at different stages of school education.	
	B	Disciplinary Streams, Choices and Opportunities The idea of choice in the 10+2 system; factors affecting the choice of subjects by students; Internal factors, (e.g. interest, teacher, etc.) vs. external factors (e.g. availability, family, market, etc.); interdisciplinary combinations and choices.	

C	Social perceptions and stereotypes: why are certain subjects considered more difficult? The impact of knowledge-related stereotypes on choices made by schools, parents and students; Knowledge and opportunities: employment and careers. Knowledge, status and power.	
Unit 3	**Knowledge and Curriculum Policy**	
A	Study of relevant parts and recommendations of major reports that have shaped curriculum policies in India since Independence (relevant parts of the following documents to be studied in order to examine the assumptions about knowledge underlying their recommendations):	
B	Learning without Burden Yash Pal Report, National Curriculum Framework 2005, NPE 2019.	
C	Persistent debates in curriculum policy: integrated approach vs. subject-specific teaching; can values be taught? academic vs. vocational subjects; etc.	
Unit 4	**Knowledge in Syllabus and Textbooks**	
A	Distinction and the relation between 'Curriculum' and 'Syllabus' Relation between Syllabus and Textbooks; implications of 'prescribing' a textbook;	
B	Importance of other sources and resources of knowledge; role of different agencies and their functions in shaping the syllabus: Boards of Examination, NCERT, etc;	
C	Examination' as a system; impact of the examination system on the socially popular concept of knowledge and the practices of teaching based on it.	
Unit 5	**Practicum**	
A	Analysis of factors that have shaped the personal trajectories of students in the context of disciplines and subject choices made in school and college.	
B	Analysis of stereotypes and their impact on subject choices at 10+2 stage.	
C	Writing a reflective essay on the above issues.	
Mode of examination	Theory	

Weightage Distribution	CA	MTE	ETE
	30%	20%	50%

•	• **Text books***	• Hirst, P.H. (1964). Knowledge and Curriculum. London: Routledge and Kegan Paul • Piaget, J. (1972). The Epistemology of Interdisciplinary Relationships. Paris: Organization for Economic Cooperation and Development. • Areekkuzhiyil, Santhosh. (2017). Understanding Discipline and Subjects. Hyderabad: Neelkamel Publishers.
•	**References**	• Readings Apple, Michael: Ideology and Curriculum • Dewey, John: How We Think • Krishna, Daya: Gyan Meemansa. • Kumar, Krishna: What is Worth Teaching? • NCERT (2005). New Curriculum Framework (2005). New Delhi: National Council of Educational Research and Training. • NCERT: National Focus Group Position Papers on the Teaching of Science; Social Science; Mathematics; Curriculum, Syllabus, Textbooks; Work and Education. • NCTE (2014). Teacher Education Regulations 2014, Norms and Standards, and New Curriculum Frameworks. New Delhi: National Council for Teacher Education • Piaget, Jean. Child and Reality • Russell, Bertrand, 'Knowledge and Wisdom' • Joseph Schwab: The Structure of Knowledge and the Curriculum.

BSP 215: DEVELOPMENTAL BIOLOGY OF PLANTS LAB

School: SOE		**Batch:2020-2024**
Program: B.Sc B.Ed		**Current Academic Year: 2021-22**
Branch: Education		**Semester: IV**
1	**Course Code**	**BSP 215**
2	**Course Title**	**Developmental Biology of Plants Lab**
3	**Credits**	2
4	**Contact Hours (L-T-P)**	0-0-3
5	**Course Status**	Compulsory
6	**Course Objectives**	1. Development of male and female reproductive structure in plants i.e., pollen grain, cytoplasmic male sterility, mega sporogenesis, gene expression during megasporogenesis. 2. Development of root i.e., cellular organization in a developing root. 3. Development of Shoot i.e., leaf primodium, auxillary meristem 4. Development of leaf. 5. Development of Flowers; transition from vegetative to reproductive development and ABC Model of flower development.
7	**Course Outcomes**	After successfully completion of this course students will be able to: CO1: Demonstrate safe laboratory practices and concept of how to conduct an experiment in plant developmental biology lab. CO2: Estimate the the amount of protein in solutions using protein binding dye assay. CO3: Amalgamation of tools for the process of embryo development in angiosperms. CO4: Perform the process of Diffusion and Osmosis. CO5: To evaluate the effect of dormancy.
8	Course Description	This course outlines the basic Overview of plant development distinguished embryologists of the World. The course shall focus in detail Development of male and female reproductive structure i.e., pollen grain, cytoplasmic male sterility, megasporogenesis, gene expression during megasporogenesis, Development of root

		i.e., cellular organization in a developing root, Developmet of Shoot i.e., leaf primodium, auxillary meristem and leaf development. It will also focus on development of Flowers; transition from vegetative to reproductive development and ABC Model of flower development.
	Unit 1	
	A	
	B	To learn the concept of how to conduct an experiment in plant developmental biology.
	C	Measuring the amount of protein in solutions using protein binding dye assay
	Unit 2	
	A	Prepare wet mounts of an onion cell and an Elodea leaf cell and observe development of both under the microscope
	B	To learn the process of Diffusion
	C	To learn the process of Osmosis
	Unit 3	
	A	To learn the process of embryo development in angiosperms
	B	To observe the effect of dormancy
	C	Isolation of different male gametophytes parts from plants
	Unit 4	
	A	To learn the process of development of root hair
	B	To learn the process of development of Secondary/adventious root development
	C	To observe the fate of new meristems
	Unit 5	
	A	To observe changes in plant from vegetative to reproductive development
	B	To observe Floral meristem pattern
	C	To learn ABC Model of flower development
	Mode of examination	Practical/or Viva

	Weightage Distribution	CA	MTE	ETE
		60%	0%	40%

	Text book/s*	Plant Biology, Alison M. Smith et al., Garland Science, Taylor & Francis Group, 2010, ISBN 978-0-8153-4025-6
	Other References	Developmental Biology, Tenth Edition. Scott F. Gilbert, editor.Sunderland, MA: Sinauer Associates, ISBN-13: 978-0878939787

BSP 216: PHYSICS PRACTICAL

School: SOE	Batch: 2020-24
Program: B.Sc.B.Ed.	Current Academic Year: 2021-22
Branch: Education	Semester: IV
1	Course Code	BSP 216
2	Course Title	Physics Practical
3	Credits	1
4	Contact Hours (L-T-P)	0-0-2
	Course Status	Co Requisite
5	Course Objectives	1. To provide training in the broad methodology of science through investigatory type and open-ended laboratory exercises. 2. To validate the theoretical basis of the experiments. 3. To perform the experiments related to reflective index in different medium. 4. To help the students with the Construction of full wave, Centre tapped and Bridge rectifiers. 5. To Wavelength of sodium D1 & D2 lines using Diffraction gratingTo provide training in the broad methodology of science through investigatory type and open-ended laboratory exercises. 6. To validate the theoretical basis of the experiments.
6	Course Outcomes	The students will be able to 1. Apply the broad methodology of science through investigatory type and open-ended laboratory exercises. 2. To validate the theoretical basis of the experiments. 3. To perform the experiments related to reflective index in different medium. 4. Construction of full wave, Centre tapped and Bridge rectifiers. To find Wavelength of sodium D1 & D2 lines using Diffraction grating
7	Course Description	This course will help the students to gain the knowledge about the broad methodology of science through investigatory type and open-ended laboratory exercises.
8		
	Unit 1	
	A	• To determine the refractive index (n) of a liquid by Liquid Lens.
	B	• Determination of 'R' of a Lens using the Newton's ring arrangement.
	C	• Determination of thickness of a paper foil using Air wedge setup.
	Unit 2	
	A	• Refractive index (n) of the material of Prism by Spectrometer-

		measuring angle of minimum deviation.
B		• To determine the refractive index (n) of glass & water by apparent depth method.
C		• Specific rotation of sugar solution using Polarimeter.
Unit 3		
A		• Spectrometer- i1- i2 curve.
B		• Refractive index of glass prism (i-d curve).
C		• Spectrometer-solid prism- Dispersive power.
Unit 4		
A		• Wavelength of sodium D1 & D2 lines using Diffraction grating.
B		• Newton's rings-wavelength of sodium light.
C		• Cauchy's constants A & B using spectrometer.
Unit 5		
A		• p– n junction diode characteristics
B		• Half wave Rectifier
C		• Construction of full wave, Centre tapped and Bridge rectifiers
Mode of Examination	Jury+Practical+Viva	

Weightage Distribution	CA	MTE	ETE
	60%	0%	40%

References

- B.L.Flint & H.T.Worsnop, Advanced Practical Physics for students, Asia Publishing huHouse, 1971.
- E Armitage, Practical Physics, John Murray.
- PSSC Physics Laboratory Guide.
- S.Panigrahi & B.Mallick, Engineering Practical Physics, Cengage Learning India Pvt.Ltd., 2015
- Indu Prakash and Ramakrishna, A Text Book of Practical Physics, 11th Edition, Kitab Mahal, New Delhi, 2011.
- Jerry D Wilson and Cecilia A. Hernández-Hall Physics Laboratory Experiments 7th Edition, Cengage Learning, 2009.
- S.Panigrahi & B.Mallick, Engineering Practical Physics, Cengage Learning India Pvt. Ltd., 2015.
- Michael Nelson and Jon M. Ogborn, Advanced level Physics Practicals, 4th Edition, reprinted, Heinemann Educational Publishers, 1985.

BSP217: CHEMISTRY PRACTICAL

School: SOE	Batch: 2020-24
Program: B.Sc. B. Ed.	Current Academic Year: 2021-22
Branch: Education	Semester: IV

1	Course Code	BSP217
2	Course Title	Chemistry Practical
3	Credits	1
4	Contact Hours (L-T-P)	0-0-2
	Course Status	Co Requisite
5	Course Objectives	1. To study the energetics of chemical reactions 2. To find out the equilibrium constants of selected systems 3. To study the behaviour of immiscible liquid systems. 4. To appreciate the physical properties of liquids and liquid mixtures.
6	Course Outcomes	After the completion of this course, the students will be able to CO1: discuss chemical changes caused due to heat energy CO2: observe the equivalence point for titration of an acid and a base CO3: understand the behaviour of immiscible liquids CO4:to find out the equilibrium constants of some selected systems. CO5: appreciate and identify the physical properties (molecular weight, density, refractive index etc) of liquids and liquid mixtures.
7	Course Description	This course is concerned with the application of thermodynamics and energetics of chemical reactions.
8		
	Unit 1	

A	•	Determination of heat of neutralization of acids and bases. Verification of Hess's law of constant heat summation.
B	•	Determination of solubility of sparingly soluble salt at various temperature, calculation of enthalpy of solution.
C	•	pH titration of acid versus base (observation of change in pH
Unit 2		
A	•	Determination of equilibrium constant of hydrolysis of an ester (ethyl acetate/methyl acetate)
Band C	•	Determination of solubility product constant (Ksp) of a sparingly soluble salt
Unit 3		
A	•	Determination of dissociation constant of phenolphthalein/methyl orange by colorimetric method.
B	•	Determination of dissociation constant of a weak acid.
C	•	Determination of percentage composition of the given NaCl solution by miscibility temperature method (phenol-water system).
Unit 4		
A	•	Determination of distribution coefficient of benzoic acid between water and toluene or acetic acid between water and 1-butanol.
B	•	Determination of transition temperature of a given salt hydrate by thermometric method.
C	•	Determination of molecular weight of a given substance by Rast's method.
Unit 5		
A	•	Determination of molecular weight of a given liquid by steam distillation.
B	•	Determination of density, coefficient of viscosity and surface tension of the given liquid.
C	•	Determination of refractive index of pure liquids and liquid mixtures.

	Mode of Examination	Jury+Practical+Viva		
	Weightage Distribution	CA	MTE	ETE
		60%	0%	40%
	References	Systematic Experiments in Chemistry by Arun Sethi.		

BSP218: BIOLOGY OF CHORDATES LAB

School: SOE	**Batch: 2020-2024**	
Program: B.Sc. B.Ed.	**Current Academic Year: 2021-22**	
Branch: Education	**Semester: IV**	
1	**Course Code**	**BSP218**
2	**Course Title**	**Biology of Chordates Lab**
3	**Credits**	2
4	**Contact Hours (L-T-P)**	0-0-3
	Course Status	Compulsory
5	**Course Objectives**	The students will be able to- 1. To appreciate the range and diversity of organisms within Phylum Chordata. 2. To learn the distinguishing characteristics of each major vertebrate class. 3. Understand about the distribution of species across different zoogeographical realms 4. To become skilled in the use of a dichotomous key to identify animal specimens. 5. To design their own dichotomous key.
6	**Course Outcomes**	After the successful completion of this course students will be able to: CO1: Know the characteristic features of hemichordates. CO2: Understand the characteristic features of cyclostomes and pisces. CO3: Learn about the characteristics of amphibians and reptiles. CO4: Get complete understanding about aves and mammalian species. CO5: Understand about the distribution of species across different zoogeographical realms. CO6: To get a complete knowledge about various species that comes under phylum chordata.
7	**Course Description**	The aim of this course is to provide better understanding about different species of hemichordates and chordates. The student get acquainted with various characteristic features of chordates along with zoogeographical distribution across the world.
8	**Outline syllabus**	

Unit 1	**General survey of chordates through charts/models and e-resources**:
a, b, c	**Hemichordata**: Balanoglossus; Protochordata - Herdmania, Doliolum, and Branchiostoma, T.S. Branchiostoma through different regions
Unit 2	
a, b	**Cyclostomata** – Myxine, Petromyzon and Ammocoetes larva
c	**Chondrichthyes** - Zygaena, Pristis, Narcine, Trygon and Rhinobatus **Actinopterygii** – Polypterus, Labeorohita, Hippocampus, Syngnathus, Exocoetus, Lophius, Solea and Anguilla **Dipneusti** (Dipnoi) – Any of the lungfishes
Unit 3	
a, b	**Amphibia** – Necturus, Proteus, Amphiuma, Salamandra, Ambystoma, Hyla, Rhacophorus, Ichthyophis and Axolotl larva
c	**Reptilia**- Tortoise, Turtle, Hemidactylus, Draco, Varanus, Phrynosoma, Chamaeleon, Typhlops, Python, Ptyas, Bungarus, Naja, Hydrus, Vipera, Crocodilus, Gavialis and Alligator Key for identification of poisonous and non-poisonous snakes
Unit 4	
a, b	**Aves**: Anas, Ardea, Milvus, Pavo, Tyto, Alcedo, Eudynamis, Casuarius and Struthio; types of beaks and claws
c	**Mammalia** – Echidna, Ornithorhynchus, Macropus, Erinaceus, Sorex, Loris, Macaca, Manis, Hystrix, Funambulus, Felis, Capra, Canis, Herpestes, Pteropus and Leo
Unit 5	
a, b, c	Power point presentation on study of animals from any two zoogeographical realms.
Mode of examination	Practical/Viva

Weightage Distribution	CA	MTE	ETE
	60%	0%	40%

Textbook/s*	Verma, Prem Singh. *A Manual of Practical Zoology: Chordates*. S. Chand Publishing, 2000.
Other References	1. Young, J. Z. (2004). The Life of Vertebrates. III Edition. Oxford university press. 2. Pough H. Vertebrate life, VIII Edition, Pearson International. 3. Darlington P.J. The Geographical Distribution of Animals, R.E. Krieger Pub. Co.

SEP 103: EPC2: ARTS IN EDUCATION

School: SOE		**Batch: 2020—2024**	
Program: B.Sc. B.Ed.		**Current Academic Year: 2021-22**	
Branch: Education		**Semester: IV**	
1	**Course Code**	**SEP 103**	
2	**Course Title**	**Arts in Education**	
3	**Credits**	2	
4	**Contact Hours (L-T-P)**	0-0-3	
	Course Type	Co Requisite	
5	**Course Objectives**	The course will enable the people-teachers to - 1. Understand basics of different art forms. 2. Develop artistic and aesthetic sensibility among learners to enable them to respond to the beauty in different art forms, through genuine exploration, experience and free expression. 3. Acquire skills for integrating different art forms across school curriculum for better learning and development. 4. Develop awareness of the rich cultural heritage of the country	
6	**Course Outcomes**	After the completion of the Course the student teacher will be able to- CO1.Understand the various aspects of arts CO2. Demonstrate the skills for integrating different art forms across school curriculum for better learning and development CO3. Develop awareness about rich cultural heritage of the country. CO4. Analyze and apply artistic and aesthetic sensibility among learners to enable them to respond to the beauty in different art forms, through genuine exploration, experience and free expression	
7	**Course Description**	Arts Education as one of the domains of knowledge is taught as a compulsory curricular area up to class X. There is a need to integrate arts education in the formal schooling of students to retain our unique cultural identity in all its diversity and richness and encourage young and creative minds. The NCF-2005	

recommends Arts Education as a subject as well as a pedagogical tool to make teaching and learning of other subjects more meaningful. The course on Arts in Education has been designed keeping in view the development of the self through arts for every student teacher and for the development of student in school through arts in education to be practiced by every teacher.

In the Bachelor of Education programme, students will be exposed to different art forms where they will develop basic skills of the art forms through hands on experience and integration of arts as pedagogy in different subject areas. They will also use these skills in practice teaching during school internship. Arts education also helps in enhancing analytical and critical thinking among students and learning through the arts and its related skills will help the student-teachers in developing their communication and inter-personal skills as well as presentational skills by bringing these in their teaching practice. For this, not only Art teachers but every teacher in the school system needs to be sensitized to understand and experience the Arts, for holistic development of the learner, as a teacher as well as an individual.

8	Course Description	
	Unit 1	**Appreciation of Arts**
	A	- Identification of different performing styles and its artists; dance, music, theatre, puppetry, etc. (based on a set of slides, selected for the purpose). - Understanding Craft Traditions of India and its relevance in education (based on a set of slides, selected for the purpose); traditional crafts asa pedagogy assimilating all sciences and social sciences.
	B	Knowledge of Indian Art – from earliest to the contemporary; Visual Arts (based on a set of slides, selected for the purpose), looking at paintings, sculptures, architecture/ monuments as sources and indicators to know the historical, political, social, scientific and technological development perspectives during differentperiods.
	C	Indian festivals and fairs, the traditions and their significance, the spirit of celebrations as a socialphenomenon
	Unit 2	**Practicum - Visual Arts and Crafts**
	A	Hands on experience of working in different media and materials (drawing, painting, clay modelling, collage making etc. with pencil, pen, crayons, dry and watercolours, clay, paper, etc.), methods and techniques (block printing, collage making, clay modelling, relief work, heritage crafts etc.) to learn visual art processes and its pedagogical aspects related to other subject areas.

B		• Exploring arts in education as a pedagogy across school curriculum and identifying themes and concepts for integrated learning for arts.
C		• Preparation and presentation techniques for effective classroom learning by developing aids and making the school environment aesthetically viable using artifacts and displays.
Unit 3	**Performing Arts: Dance, Music, Theatre and Puppetry**	
A	Listening/viewing and exploring regional music, dance, theatre and puppetry will help student-teachers in contextualizing different art forms and relating them with various concepts across the curriculum	
B	Drama in education; learning is enhanced through drama in education; it enhances communication skills and develop personality and self. Adaptation of different texts and concepts or themes from the curricular areas to be practiced by student-teachers.	
C	Planning a stage-setting for a performance, presentation and participation by the student-teachers in any one of the regional performing art forms keeping integrated approach of all art forms with other subjects isrecommended	
References	• Council of Chief State School Officers (1992). Model standards for beginning teacher licensing and development: a resource for state dialogue. Washington, dc: council of chief state school officers. • Day, Michael d., ed. (1997). Preparing teachers of art. Reston, va: national art education association. • Darling-Hammond, Linda, and Cobb, Velma l. (1996). "The changing context of teacher education." in the teacher educator's handbook: building a knowledge base for the preparation of teachers, ed. Frank b. Murray. San Francisco: Jossey-Bass. • Gailbraith, Lynn. (1993). "Familiar, interactive, and collaborative pedagogy: changing practices in preservice art education." Art Education 46 (5):6–11. • Gailbraith, Lynn, ed. (1995). Preservice art education: issues and practice.reston, va: National Art Education Association. • Gore, Jennifer M. (2001). "Beyond our differences: A reassembling of what matters in teacher education." Journal of Teacher Education 52 (2):124–135. • Henry, Carol (1999). "The role of reflection in student-teachers' perceptions of their professional development." Art Education 52 (2):14–20. • Kowalchuk, Elizabeth a. 1999. "Perceptions of practice: What art student-	

teachers say they learn and need to know?" Studies in Art Education 41 (1):71–90.

- National Art Education Association (1999). Standards for art teacher preparation. Reston, va: National Art Education Association.

- Zimmerman, Enid (1994). "Current research and practice about pre-service visual art specialist teacher education." Studies in Art Education 35 (2):79–89.

- Zimmerman, Enid (1994). "Concerns of pre-service art teachers and those who prepare them to teach." Art Education 47 (5):59–67.

- Consortium of national arts education associations; International council of fine arts deans; and council of arts accrediting associations. 2001. To move forward. (www.naea-reston.org/tomove.pdf).

- International council of fine arts deans. 1998. "Teacher education in the arts for the twenty-first century." (www.rowan.edu/icfad)

Note- MOOCs-SWAYAM-Physics/Botany Credits-3

SEMESTER V

BSI301: ATOMIC AND MOLECULAR PHYSICS

School: SOE	Batch: 2020-24	
Program: B.Sc. B.Ed.	Current Academic Year: 2022-23	
Branch: Education	Semester: V	
1	Course Code	BSI301
2	Course Title	**ATOMIC AND MOLECULAR PHYSICS**
3	Credits	4
4	Contact Hours (L-T-P)	4L+ 0T +0P
	Course Status	Core
5	Course Objectives	• To enable students to 1. Gain the basic knowledge of classical and quantum mechanics at the atomic and molecular level 2. Apply the basic knowledge of classical and quantum mechanics at the atomic and molecular level. 3. Gain an insight into Zeeman effect and Peschen effect 4. Explain rotational, vibrational, electronic and Raman spectra of molecules. 5. Create an understanding for theoretical models, terminology and working methods used in atomic and molecular physics
6	Course Outcomes	After the completion of this course, the student will be able to CO1. determine the e/m charge of an electron, explain the defects of Bohr's model of atomic structure and understand the usage of Rydberg's constant CO2. explain the change in behavior of atoms in external applied electric and magnetic field using established theories CO3. Describe electron spin and nuclear magnetic resonance spectroscopy and their applications. CO4: describe Zeeman effect and Peschen effect CO5. Explain rotational, vibrational, electronic and Raman spectra of molecules.

		CO6: account for theoretical models, terminology and working methods used in atomic and molecular physics
7	**Course Description**	The course prepares the student for further studies in applied atomic and molecular physics, basic material physics and research in atomic and molecular physics.
8	**Outline Syllabus**	
	Unit 1	**ATOMIC PHYSICS –I**
	A	• The Electron: Determination of e/m of an electron by Thomson method, Determination of charge of an electron by Millikan's oil drop method.
	B	• Atomic Spectra: Inadequacy of Bohr atomic model, correction due to finite mass of the nucleus.
	C	• Rydberg constant in terms of reduced mass, Excitation and Ionization potentials.
	Unit 2	**ATOMIC PHYSICS –I**
	A, B and C	• Franck-Hertz experiment, Bohr-Sommerfeld Model of atom, relativistic mass correction, vector model of an atom, Electron spin, space quantization, magnetic moment of an electron due to its orbital motion. Stern-Gerlach experiment and its theory.
	Unit 3	**ATOMIC PHYSICS –II**
	A	• Spin-orbit interaction and Fine structure of spectral lines. Quantum numbers and selection Rules. Pauli's exclusion principle.
	B and C	• Electronic configuration of atoms. Valence electron and a brief mention of L-S and J-J coupling for multi electron atoms. Fine structure lines of Sodium
	Unit 4	**ATOMIC PHYSICS –II**
	A, B and C	• Zeeman Effect. Explanation of Zeeman Effect on the basis of vector model of atom, Expression for Zeeman shift and experimental details. Mention on anomalous Zeeman Effect, A qualitative mention of Paschen – Back and Stark effects.
	Unit 5	**MOLECULAR SPECTRA**
	A	• Molecular formation, the molecular ion, H_2 – molecule. Salient features of molecular spectra.
	B	• Rotation, vibration and electronic spectra of molecules, associated quantum numbers and selection rules.
	C	• Theory of pure rotation and rotation- vibration spectra, Raman and Infrared (IR) spectra, simple applications.
	Mode of	Theory

Examination			
Weightage Distribution	CA	MTE	ETE
	30%	20%	50%
Text books*	R. Murugeshan and K. Sivaprasath Modern Physics, S. Chand Publisher, 1994.		
Other References	H. S. Mani and G. K. Mehta, Introduction to Modern Physics, Affiliated East-West Press, India, 1990. - Arthur Beiser, Perspectives of Modern Physics, McGraw-Hill Inc.,US; International edition. - J.R. Taylor, C.D. Zafiratos, Modern Physics, M.A. Dubson, PHI Learning, 2009. - R.A. Serway, C.J. Moses, and C.A.Moyer, Modern Physics, Cengage Learning, 2005. G. Kaur and G.R. Pickrell, Modern Physics, McGraw Hill, 2014. - Rich Meyer, Kennard, Coop, Introduction to Modern Physics, Tata McGraw Hill, 2002. J. R. Reitz, F. J. Milford, and R. W. Christy, Foundations of Electromagnetic Theory, Addison-Wesley; 4 edition, 2008. - Banwell and E. Mccash, Fundamentals for Molecular Spectroscopy, McGraw Hill Education; 4 edition, 1994. H. E. White, Atomic Spectra –, McGraw-Hill, 1954.		

BSI302: PLANT BIOTECHNOLOGY

School: SOE		**Batch: 2020-2024**
Program: B.Sc.B.Ed		**Current Academic Year: 2022-23**
Branch: Education		**Semester: V**
1	**Course Code**	**BSI302**
2	**Course Title**	**Plant Biotechnology**
3	**Credits**	4
4	**Contact Hrs (L-T-P)**	4-0-0
	Course Status	Core

5	**Course Objective**	1. To introduce students with the
		
		  1. Basic concepts and techniques involved in Plant Biotechnology
		
		  2. Culture media for plants, its formulations and the culturing methods in Plant Tissue Culture
		
		  3. Basic concepts of plant tissue culture and its application for human, social and environmental welfare.
		
		  4. Knowledge about the production and optimization of secondary metabolites by using different cultural techniques
		
		  5. Knowledge of the applications of Plant Biotechnology are applied for human, social and environmental welfare.

6	**Course Outcomes**	CO1 The student will be able to understand the concept of totipotency, concept of culture media for plants and its formulations. CO2 The student will learn about the culturing methods in Plant Tissue Culture. CO3 The student will be able to explain the process of zygotic and somatic embryogenesis. CO4 The student will be able to demonstrate the process of micropropagation and its utility.

		CO5The student will learn about production and optimization of secondary metabolites by using different cultural techniques.
		CO6The students will learn about the basic concepts of plant tissue culture and it application for human, social and environmental welfare.
7	Course Description	Help student to understand the concept of totipotency, culture media for plants, its formulations and the culturing methods in Plant Tissue Culture. The student will be able to explain the process of embryogenesis, demonstrate the process of micropropagation and its utility. Student will learn about optimized production of secondary metabolites by using culture techniques.
8	Course Outlines	

Unit 1	**Introduction of plant Biotechnology**
A	History of plant tissue culture
B	Concept of totipotency
C	Media composition & Growth Hormones
Unit 2	**Culture Initiation**
A	Explant; Callus Initiation
B	maintenance of callus, Subculture
C	Cytodifferentiation- advantage and disadvantage
Unit 3	**Somatic Embryogenesis**
A	Somatic and zygotic embryo
B	Process of embryogenesis; isolation of protoplast & its fusion
C	Somatic and zygotic embryo
Unit 4	**Micropropagation**
A	Micropropagation – concept and definition
B	Micropropagation technique
C	Purpose of micropropagation
Unit 5	**Factors responsible for micropropagation**

A	Types of micropropogation	
B	Factors affecting the process	
C	Significance of micropropogation	
Mode of Examination	Theory/Jury/Practical/Viva	
Weightage Distribution	CA	MTE	ETE
	30%	20%	50%
Textbook/s*	• Bhojwani S.S., Dantu P.K., "Plant Tissue Culture: An Introductory Text", Springer, 2013. • Stewart C.N., "Plant Biotechnology and Genetics: Techniques and Applications", Wiley-Interscience' 2008.		
Other References	Oksman-Caldentey K-M., "Plant Biotechnology and Transgenic Plants; CRC Press, 2002		

BSI303: TRANSITION OF ELEMENTS, COORDINATE COMPOUNDS AND CHEMICAL KINETICS

School: SOE		**Batch: 2020-24**
Program: B.Sc. B. Ed.		**Current Academic Year: 2022-23**
Branch: Education		**Semester: V**
1	**Course Code**	**BSI 303**
2	**Course Title**	**TRANSITION OF ELEMENTS, COORDINATE COMPOUNDS AND CHEMICAL KINETICS**
3	**Credits**	4
4	**Contact Hours (L-T-P)**	4L+ 0T +0P
	Course Status	Core
5	**Course Objectives**	To acquire the knowledge of 1. coordination compounds, 2. d and f block elements 3. States of matter 4. Production and optimization of secondary metabolites by using different cultural techniques 5. Kinetics of chemical reactions.
6	**Course Outcomes**	After the completion of this course, the student will be able to- CO1: explain the behavior of d-Block elements, their interrelationship CO2: compare the f-Block elements in terms of their electronic configuration, extraction of transition metals CO3: understand the formation and stability of coordination complexes, VBT and CFT CO4: interpret the theoretical and experimental methods of chemical

		kinetics.
		CO5: describe the surface phenomenon in terms of adsorption and catalysis
7	**Course Description**	This course is aimed to provide the students with an understanding of all the fundamental concepts inorganic chemistry necessary for the study of the more advanced or specialized courses that follow. The topics discussed include transition elements, lanthanides, actinides and kinetics of chemistry.
8	**Outline Syllabus**	
	Unit 1	**d-BLOCK ELEMENTS**
	A	• Electronic configuration and characteristic properties of d block elements- ionic radii; Oxidation states, complexation tendency; magnetic behavior and electronic spectral properties,
	B	• Stability of various oxidation states Comparison of 3d elements with 4d & 5d elements. Coordination number, geometry
	C	• Stability of various oxidation states Comparison of 3d elements with 4d & 5d elements. Coordination number, geometry
	Unit 2	**f-BLOCK ELEMENTS**
	A	• Comparative study of lanthanide and actinide elements with respect to electronic configuration; atomic and ionic radii; Oxidation state and complex formation;
	B	• Lanthanide and actinide contraction; Occurrence of Lanthanides and Actinides; Principles of separation of lanthanides and actinides.
	C	• Extraction of Thorium, Uranium and Plutonium from burnt nuclear fuels.
	Unit 3	**BASICS OF COORDINATION CHEMISTRY**
	A	• Isomerism in coordination compounds, valence bond theory of transition metal, Werner's coordination theory and its experimental verification, nomenclature of coordination, Limitations of VBT.

B		• Elementary treatment of crystal field theory, splitting of d orbitals in octahedral and tetrahedral complexes, factors affecting crystal field parameter, qualitative treatment of magnetic and electronic properties based on CFT
C		• Effective atomic number, 18 electron rules.
Unit 4	**CHEMICAL KINETICS**	
A		• Chemical kinetics and its scope, rate of a reaction, factors influencing the rate of a reaction – concentration, temperature, pressure, solvent, light, catalyst.
B		• Concentration dependence of rates, mathematical characteristics of simple chemical reactions – zero order, first order, second order, pseudo-order, half-life and mean life. Determination of the order of reaction – differential method, method of integration, method of half-life period and isolation method.
C		• Effect of temperature on rate of reaction, Arrhenius equation, concept of activation energy, Simple collision theory, Expression for the rate constant based on equilibrium constant and thermodynamic aspects.
Unit 5	**SURFACE PHENOMENA**	
A		• Adsorption: Absorption and adsorption (definition, examples and differences) types of adsorptions-physical and chemical (definition, examples and differences between them), factors influencing the adsorption of gases on solids.
B		• Adsorption isotherms: definition, Mathematical expression for Freundlich and Langmuir's adsorption isotherms.
C		• Catalysis: Definition, general characteristics, action of catalytic promoters and inhibitors. Homogeneous and heterogeneous catalysis (definition and example). Enzymes: definition, lock and key mechanism
Mode of Examination	Theory	

Weightage Distribution	CA	MTE	ETE
	30%	20%	50%
Text books*	•		
Other References	1. Concise Inorganic Chemistry; J. D. Lee; 5th Edition (1996); Chapman & Hall; London.		
	2. Miessler, G. L. & Donald, A. Tarr. *Inorganic Chemistry* 4th Ed.,Pearson, 2010.		
	3. Essentials of physical chemistry Arun Bahl,B.S. Bahl,G.D. Tuli		
	4. Principles of Physical Chemistry Puri,Sharma and Pathania.		

BSI304: MULTIVARIATE CALCULUS & VECTOR CALCULUS

School: SOE	**Batch: 2020-24**	
Program: B.Sc. B.Ed.	**Current Academic Year: 2022-23**	
Branch: Education	**Semester: V**	
1	**Course Code**	**BSI304**
2	**Course Title**	**Multivariate Calculus & Vector Calculus**
3	**Credits**	**5**
4	**Contact Hours (L-T-P)**	4-1-0
	Course Status	Core
5	**Course Objectives**	To enable the students to 1. Understand the concepts of multi-variate calculus 2. Gain an insight into vector calculus. 3. Compute the areas of plain regions, surfaces and volume of solids. 4. Gain knowledge about Laplace Transform of some standard functions & Inverse Laplace transform & explain its application and solve linear differential equations. 5. Have a brief introduction of Z-transform.
6	**Course Outcomes**	CO1: Explain and illustrate the concepts of vector differentiability of function along with its applications. CO2: Describe the properties of divergence and curl; evaluate irrotational and solenoidal vector fields. CO3: Describe line integral, surface integral, and volume integral,explain its application and Gauss divergence theorem, Stoke'stheorem) CO4: Describe Laplace Transform of some standard functions & Inverse Laplace transform & explain its application and solve linear differential equations. CO5: Describe the Fourier Series and evaluate the expansion of functions in terms of Fourier series. CO6: Describe and analyze the basic concepts of Z-transform and it's application.

7	**Course Description**	This course is an initiate the advancement of calculus. The primary objective of the course is to develop the basic understanding of the concept of Laplace transform, Fourier series, Vector differentiation & Vector Integration along with the brief introduction of Z-transform.
8	**Course Outlines**	
	Unit 1	**Vector Differentiation:**
	A	Definition of a line integral and basic properties, Evaluation of line integrals, Definition of double integral
	B	Evaluation of Double integral, change of variables,
	C	Surface areas. Definition of a triple integral, Evaluation, Volume as a Triple integral.
	Unit 2	
	A	Improper integrals of the first and second kinds, Convergence, Gamma and Beta functions,
	B	Connection between Beta and Gamma functions, Application to Evaluation of Integrals,
	C	Duplication formula, Sterling formula.
	Unit 3	
	A	Quadratic Curves, surfaces,
	B	sphere, cylinder, cone,
	C	Ellipsoid, Hyperbloid, Parabloid.
	Unit 4	
	A	Vectors, Scalars, Vector field, Scalar field, Vector differentiation,
	B	The Vector Differential operator del, gradient, curl,
	C	Vector integration,
	Unit 5	
	A	The Divergence theorem of Gauss
	B	Stoke's Theorem,
	C	Green's Theorem in plane.

Mode of Examination	Theory		
Weightage Distribution	CA	MTE	ETE
	30%	20%	50%
Text books*	• Theorem and its applications.		

BSI305: COMPARATIVE ANATOMY OF VERTEBRATES

School: SOE	Batch: 2020-24
Program: B.Sc. B.Ed.	Current Academic Year: 2022-23
Branch: Education	Semester: V
1	Course Code	BSI305
2	Course Title	Comparative Anatomy of Vertebrates
3	Credits	4
4	Contact Hours (L-T-P)	4-0-0

	Course Status	**Core**
5	**Course Objectives**	1. To appreciate the range and diversity of organisms within the vertebrates.
		2. To learn the anatomical characteristic features of all vertebrate classes.
		3. To understand the differences in the body systems of the vertebrate species.
		2. To comprehend the evolution via comparing vertebrate classes anatomically and physiologically.
		3. To get a complete understanding of different sense organs of vertebrates and invertebrates.
6	**Course Outcomes**	After the successful completion of this course students shall be able to:
		CO1: Know about the integumentary and skeletal system of vertebrates in general.
		CO2: Understand the digestive and respiratory systems of vertebrates.
		CO3: Learn about the characteristics features of circulatory and urinogenital systems found in vertebrate species.
		CO4: Get complete understanding about sense organs.
		CO5: Understand about the course of embryological development.
		CO6: To get a complete knowledge about various anatomical, physiological and developmental characteristics of vertebrates.
7	**Course Description**	The aim of this course is to provide better understanding about different species of vertebrates. The student gets acquainted with various characteristic features of vertebrates in context to anatomy and development
8	**Outline syllabus**	
	Unit 1	**Integumentary System & Skeletal System**
	A	Structure, functions and derivatives of integument
	B	Overview of axial and appendicular skeleton, Jaw suspensorium
	C	Visceral arches
	Unit 2	**Digestive System & Respiratory System**
	A	Alimentary canal and associated glands,
	B	dentition, Skin, gills, lungs and air sacs;
	C	Accessory respiratory organs

Unit 3	Circulatory System & Urinogenital System		
A	General plan of circulation,		
B	evolution of heart and aortic arches,		
C	Succession of kidney, Evolution of urinogenital ducts, Types of mammalian uteri		
Unit 4	**Nervous System**		
A	Central nervous system		
B	Brain, Spinal cord, Cranial nerves in mammals		
C	Autonomic nervous system,		
Unit 5	**Sense Organs**		
A	Classification of receptors		
B	Brief account of visual, olfactory and auditory receptors in man		
C	Reflex Action		
Mode of Examination	Theory		
Weightage Distribution	CA	MTE	ETE
	30%	20%	50%
Textbook/s*	Cleveland P. Hickman, Jr., Larry S. Roberts, Allan Larson (2003). Animal Diversity. 3rd Edition. McGraw−Hill		
Other References	• Kotpal, R. L. Modern Textbook of Zoology: Vertebrates. Rastogi Publications, 2012. • Purves et al: Life-the Science of Biology, (7thed. 2004, Sinauer) • Parker &Haswell: Textbook of Zoology, Vol. II (2005, Macmillan)		

SHARDA UNIVERSITY
Beyond Boundaries

BSI306: ELECTROCHEMICALS AND PHOTOCHEMICALS

School: SOE	Batch: 2020-24
Program: B.Sc. B.Ed.	Current Academic Year: 2022-23
Branch: Education	Semester: V

1	Course Code	BSI 306
2	Course Title	ELECTROCHEMICALS AND PHOTOCHEMICALS
3	Credits	3
4	Contact Hours (L-T-P)	3L+ 0T +0P
	Course Status	DSE
5	Course Objectives	1. To introduce the basic concepts of electrochemistry 2. To familiarize the students with its applications 3. To make students familiar with a broad variety of photochemical systems and their applications. 4. To gain an understanding of photochemical and photophysical processes and mechanisms with suitable theoretical models. 5. To make the students understand the photochemical phenomena of Fluorescence, phosphorescence, chemiluminescence
6	Course Outcomes	After the completion of this course, the students will be able to CO1: comprehend the fundamental concepts of electrochemistry and reactions on electrode surfaces; integrate the fundamental concepts with electrochemical applications such as electroplating, batteries, fuel cells, corrosion and electroanalysis. CO2: apply Nernst equation, Clausius-Menotti equation and Lorenz-Laurentz equation to different electrochemical systems. CO3: The generation and calculation of electromotive force and the application of electrochemical series in daily life. CO4: describe and explain photochemical and photophysical processes and mechanisms with suitable theoretical models. CO5: able to understand the photochemical phenomena of Fluorescence, phosphorescence, chemiluminescence.
7	Course Description	This course presents to students the concepts in photochemistry and electrochemistry
8	Course Outlines	

	Unit 1	ELECTROCHEMISTRY - I
	A	• Quantitative aspects of Faraday's laws of electrolysis, rules of oxidation/reduction of ions based on half-cell potentials, applications of electrolysis in metallurgy and industry.
	B	• Chemical cells, reversible and irreversible cells with examples. Electromotive force of a cell and its measurement, Nernst equation; Standard electrode (reduction) potential and its application to different kinds of half-cells.
	C	• Application of EMF measurements in determining free energy, enthalpy and entropy of a cell reaction, (ii) equilibrium constants, and (iii) pH values, using hydrogen, quinone-hydroquinone, glass electrodes
	Unit 2	ELECTROCHEMISTRY - II
	A	• Concentration cells with and without transference, liquid junction potential; determination of activity coefficients and transference numbers.
	B and C	• Qualitative discussion of potentiometric titrations (acid-base, redox, precipitation).
	Unit 3	ELECTROCHEMISTRY - III
	A	• Electrical properties of atoms and molecules Basic ideas of electrostatics, Electrostatics of dielectric media.
	B and C	• Clausius-Mosotti equation and Lorenz-Laurentz equation (no derivation), Dipole moment and molecular polarizabilities and their measurements.
	Unit 4	PHOTOCHEMISTRY - I
	A	• Characteristics of electromagnetic radiation, physical significance of absorption coefficients.
	B	• Laws of photochemistry, quantum yield, actinometry, examples of low and high quantum yields
	C	• Photochemical equilibrium and the differential rate of photochemical reactions, photosensitised reactions, quenching.
	Unit 5	PHOTOCHEMISTRY - II
	A	• Fluorescence, phosphorescence, chemiluminescence.
	B	• Primary and secondary processes in photochemical reactions
	C	• Photochemical and thermal reactions. Photoelectric cells.
	Mode of Examination	Theory

Weightage Distribution	CA	MTE	ETE
	30%	20%	50%

Text books*	1. Atkins P. W. & Paula, J. de, Elements of Physical Chemistry, Oxford University

		Press, 6 th Ed., (2006). 2. Puri, Sharma &Pathania, Principles of Physical Chemistry, Vishal Publishing Co, 47th Edn., 2017. 3. Kapoor, K. L., Text Book of Physical Chemistry, Mac Grow Hill, 3rdEdn., 2017 4. Castellan G. W. Physical Chemistry 4th Ed. Narosa (2004).
	Other References	1. Engel T. & Reid P., Physical Chemistry 3rd Ed. Pearson (2013). 2. Levine, I. N. Physical Chemistry 6thEd., Tata McGraw-Hill (2011). 3. McQuarrie, D. A. & Simon, J. D. Molecular Thermodynamics Viva Books Pvt. Ltd.: New Delhi (2004). 4. Kheterpal S.C., Pradeep's Physical Chemistry, Vol. I & II, Pradeep Publications 5. Rohatagi Mukherjee K K., Fundamentals of Photochemistry, Wiley Eastern Ltd., 1992. 6. Reaction Mechanism in Organic Chemistry; S. M. Mukherji and S. P. Singh.

BSI307: SOIL CHEMISTRY

School: SOE	Batch: 2020-24
Program: B.Sc. B. Ed	Current Academic Year: 2022-23
Branch: Education	Semester: V

1	Course Code	BSI307
2	CourseTitle	Soil Chemistry
3	Credits	3
4	Contact Hours (L-T-P)	3-0-0
	Course Status	Core
5	Course Objectives	At end the course, students will be able to understand and apply the components of soil and soil profile. Students will be able to understand classification of soil, soil composition, soil fertility and nutrient management.
6	Course Outcomes	Students will be able to CO1: Discuss the basic concepts of components of soil and soil profile. CO2: Describe the classification of soil in India. CO3: Describe the concept of soil fertility. CO4: Explain soil nutrient management. CO5: Describe soil texture and soil evaluation.
7	Course Description	This course describes about soil profile, soil texture, soil aggregates, classification of soil in India, nutrients management and soil fertility.
8		
	Unit 1	**Introduction to Soil science**
	A	Components of Soil, Soil Profile
	B	Soil Physical properties, Soil Texture,
	C	Textural classes, particle size analysis, soil structure, classification,
	Unit 2	**Soil aggregates and classification in India**
	A	soil aggregates, their significance

	B	soil classification of India
	C	Soil organic matter, composition, decomposability, Humus, fractionations of organic matter, carbon cycle, C:N ratio
Unit 3		**Soil Composition**
	A	Soil as a source of plant nutrients, essential and beneficial elements of soil
	B	forms of nutrients in soil, problem soils – Acid
	C	calcareous soils, characteristics of soil
Unit 4		**Nutrient management**
	A	Nutrient availabilities and management.
	B	Fertilizers and insecticides and their effect on soil, water and air
	C	Reclamation – mechanical, chemical and biological methods.
Unit 5		**Soil Fertility**
	A	Different approaches for soil fertility evaluation
	B	Soil fertility evaluation.
	C	Methods of soil testing – chemical methods, critical levels of different nutrients in soil
Mode of Examination		Theory

Weightage Distribution	CA	MTE	ETE
	30%	20%	50%

Other References	1.Text Book of Soil Science- Biswas T.D and Mukherjee. S.K. Tata McGraw Hill Publishing company, New Delhi.
	2. The nature and properties of soil – N. C. Brady & Ray R. Well.
	3. Soil and soil fertility – C.M. Thomson & F.R. Troesh.
	4. Fundamentals of soil science - Indian Society of soil science, New Delhi.

SEB 107: ASSESSMENT FOR LEARNING

School: SOE	**Batch: 2020—2024**	
Program: B.Sc. B.Ed.	**Current Academic Year: 2022-23**	
Branch: Education	**Semester: V**	
1	**Course Code**	**SEB 106**
2	**Course Title**	**Assessment for Learning**
3	**Credits**	4
4	**Contact Hours (L-T-P)**	4-0-0
	Course Type	Core
5	**Course Objectives**	The course will enable the people-teachers to – 1. Gain a critical understanding of issues in assessment and evaluation (from multiple perspectives with focus on constructivist paradigm) 2. Become cognizant of key concepts such as formative and summative assessment, evaluation and measurement, test, examination 3. Be exposed to different kinds and forms of assessment that aid student learning 4. Become the user of a wide range of assessment tools, and learn to select and construct these appropriately as per the need; and 5. Evolve realistic, comprehensive and dynamic assessment procedures keeping in view the diverse backgrounds of students.
6	**Course Outcomes**	After the completion of the Course the people- teacher will be able to CO1. Understand the concept of assessment CO2. Understand the use of quantitative & qualitative tools and techniques of evaluation CO3. Develop the skill in preparing, administering and analyzing diagnostic test CO4. Familiarize with new trends in assessment CO5. Develop the skill necessary to compute basic statistical estimates and interpret the test scores
7	**Course Description**	This Course – as its title suggests - proposes that student-teachers become conscious of the distinction between assessment *for* learning and assessment *of*

learning. Whereas both have their place in school education, a constructivist paradigm indicates a shift in emphasis towards the former. The course intends to enlarge current perspectives on assessment and evaluation, and enable student-teachers to view student learning along multiple dimensions. It brings a specific focus on assessment of subject-based learning, as well as processes of feedback and reporting, which are among the core competencies needed by teachers. A critical review of the examination system and the assessment practices that derive from this is also felt to be a necessary component of the course; so that student-teachers may learn to evolve more flexible and richer forms of assessment, even as they respond to current examination practices.

Assessment (and evaluation) is integral to school education and more specifically to teaching-learning. Since education in schools presupposes certain aims and objectives, it is crucial for teachers to be aware of how the progress and growth of students is to be assessed. This in turn implies that teachers become cognizant of which dimensions of growth or learning are to be assessed, what means are available to them for this purpose, and what effects are likely to flow from various kinds of assessment.

8	**Course Outlines**	
	Unit 1	**Concept of Evaluation**
	A	**Basic Concepts of Assessment and Evaluation** Basic Concepts: assessment, evaluation, measurement, test, examination, formative and summative evaluation, continuous and comprehensive assessment mandated under RTE, and grading.
	B	Purpose of assessment in different paradigms: a) behaviourist (with its limited view on learning as behaviour), (b) constructivist paradigm and (c) socio-culturalist paradigm
	C	Distinction between 'assessment of learning' and 'assessment for learning'; assessment as a basis for taking pedagogic decisions
	Unit 2	**Context of Assessment and Assessment Procedure**

	A	Analysis of Existing Practices of Assessment 2.1 A critical review of current evaluation practices and their assumptions about learning and development; examination for selection or rejection; role of traditional examinations in maintaining social and cultural hierarchy;
	B	Impact of examination-driven teaching on school culture and on pedagogy; content-confined testing; critique of prevailing quiz culture and popular tests such as ASSET and Olympiad; commercialization of testing
	C	Impact of the prevailing assessment practices on students' learning, their motivation and identity; detrimental effects of labelling students as slow or bright or declaring them failures; perspective behind no-detention policy in elementary grades under RTE
Unit 3		**Data Analysis, Feedback and Reporting**
	A	Assessment in the Classroom and Record Keeping : Expanding notions of learning in a constructivist perspective; ability to develop indicators for assessment; tasks for assessment: projects, assignments, formulating tasks and questions that engage the learner and demonstrate the process of thinking; scope for original responses, observation of learning processes by self, by peers, by teacher; organising and planning for student portfolios and developing rubrics for portfolio assessment, teachers' diaries, group activities for assessment.
	B	Dimensions and levels of learning, assessing conceptual development, recall of facts and concepts, application of specific skills, problem solving; application of learning to diverse and new situations.
	C	Assessment of meaning-making propensity, abstraction of ideas from experiences, identifying links and relationships; inference, analysis and reflection, originality and initiative, flexibility.
Unit 4		**Examination Reform: Issues and directions**
	A	School-based assessment and evaluation: policies, practices and possibilities National Policy on Education (1986) and Programme of Action (1992), National Curriculum Frameworks – 2005, NPE2019 developed for school education (*Discussion should cover analysis of recommendations, implementations and the emerging concern*s)
	B	Impact of examination-driven schooling on the social identity and socialization

		of children; CCE in Right of Children to Free and Compulsory Education Act, 2009 Introducing flexibility in examination-in view of the needs of the students and other stakeholders
	C	Improving quality and range of questions in exam papers, School-based credits; Role of ICT in Examination; On-demand and on-line examination
	Unit 5	**Practical (any Three)**
	A	Analysis of a range of assessment tools collected from different schools
	B	Developing worksheets and other tasks/tools for learning and assessment in one specific subject area
	C	Maintaining a portfolio related to the course-work of students during practice teaching and devising rubrics for assessment
		Constructing a test or an examination paper in one's subject area and collecting feedback from fellow teachers on the same. Observing, interviewing and writing comprehensive profile of a student.
Mode of Examination		Theory/Jury/Practical/Viva

Weightage Distribution	CA		MTE	ETE
	30%		20%	50%

Text books*	- Gunter, Mary Alice et.al (2007)., Instruction: A Models Approach- Fifth Edition; - Pearson Education Inc.; Boston. - Kubiszyn Tom. (2003). Educational Testing and Measurement, John Wiley. - Linn, Robert L. and Gronlund, Norman E. (2000). Measurement and Assessment in - Teaching; Pearson Education Inc. - Gupta Rainu(2017), Measurement, Evaluation and Assessment for Learning, Shipra Publications, New Delhi-(Text Book)

		• Aggarwal, Y.P. (2002). Statistical Methods: Concepts, Applications and Computation. New Delhi: Sterling Publishers Pvt. Limited. • Bhargava, M. and Mathur, M. (2005). Psychometrics and Statistical Applications in Educational and Behavioral Sciences. Agra: H. P. Bhargava Book House.
	Other Resources	Cohen, Louis; Manion, Lawrence and Morrison, Keith (2004); A Guide to Teaching Practice- Fifth Edition; Routledge Falmer-Taylor and Francis Group; London. Ebel Robert L., (1991). Essentials of Educational Measurement, Prentice Hall of India.

SHARDA UNIVERSITY
Beyond Boundaries

BSP301: PHYSICS PRACTICAL

School: SOE	Batch: 2020-24	
Program: B.Sc. B. Ed.	Current Academic Year: 2022-23	
Branch: Education	Semester: V	
1	Course Code	**BSP301**
2	Course Title	**Physics Practical**
3	Credits	1
4	Contact Hours (L-T-P)	0-0-2
	Course Status	Co Requisite
5	Course Objectives	1. To provide training in the broad methodology of science through investigatory type and open-ended laboratory exercises. 2. To validate the theoretical basis of the experiments. 3. TO help the students gain practical knowledge about Study of sodium lines using discharge tubes, Study of hydrogen lines using discharge tubes, Study of helium lines using discharge tubes. 4. To help the students to perform the experiment on Dissociation energy of Iodine.

6	Course Outcomes	The students will be able to
		  1. Perform the experiments listed in the course through investigatory type and open-ended laboratory exercises.
		
		  2. Validate the theoretical basis of the experiments.
		
		  3. Gain hands on knowledge of sodium lines using discharge tubes, Study of hydrogen lines using discharge tubes, Study of helium lines using discharge tubes.
		
		  4. To perform the experiment on dissociation energy of Iodine
		
		  5. Gain practical knowledge about the Excitation of Brass spectrum using Arc method, Energy gap of a semiconductor

	Unit 1	

	A	• Franck-Hertz experiment.
	B	• Study of sodium lines using discharge tubes. • Study of hydrogen lines using discharge tubes.
	C	• Study of helium lines using discharge tubes.
Unit 2		
	A	• Dissociation energy of Iodine. • Hartmann's formula for wavelength.
	B	• Benzene IR spectrum.
	C	• Rydberg Constant – Solar Spectrum
Unit 3		
	A	• Excitation of Brass spectrum using Arc method
	B	• Rutherford model – Simulation technique.
	C	• Zener diode characteristics.
Unit 4		
	A	• Transistor characteristics and transfer characteristics in Common Base configuration141current gain. • Transistor characteristics and transfer characteristics in Common Emitter configuration current gain.
	B	• CE Transistor Amplifier-Frequency response.
	C	• Basic operational amplifier.
Unit 5		
	A	• Energy gap of a semiconductor.
	B	• Bi-prism experiment. • Resolving power of grating
	C	• Current balance experiment- the effects of a magnetic field on a current carrying conductor.

		• Resolving power of a telescope.
	Mode of Examination	Jury+Practical+Viva

	Weightage Distribution	CA	MTE	ETE
		60%	0%	40%

	Text books*	•

	Other References	• B.L. Flint & H.T. Worsnop, Advanced Practical Physics for students, Asia Publishing House, 1971. • E Armitage, Practical Physics, John Murray. • PSSC Physics Laboratory Guide. • S. Panigrahi & B. Mallick, Engineering Practical Physics, Cengage Learning India Pvt. Ltd., 2015 • Indu Prakash and Ramakrishna, A Text Book of Practical Physics, 11th Edition, Kitab Mahal, New Delhi, 2011. • Jerry D Wilson and Cecilia A. Hernández-Hall Physics Laboratory Experiments7th Edition, Cengage Learning, 2009. • S.Panigrahi & B.Mallick, Engineering Practical Physics, Cengage Learning India Pvt. Ltd., 2015.

BSP302: PLANT BIOTECHNOLOGY LAB

School: SOE	Batch: 2020-24
Program: B.Sc. B.Ed.	Current Academic Year: 2022-23
Branch: Education	Semester: V

1	Course Code	BSP302
2	Course Title	Plant Biotechnology Laboratory
3	Credits	2
4	Contact Hours (L-T-P)	0-0-3
	Course Status	Co Requisite
5	Course Objective	1. To learn methods of cell isolation from tissues 2. To differentiate between animal and plant cell 3. To gain an understanding of culture techniques. 4. To again the knowledge about Preparation of drug-conjugates and to know about the purification by column chromatography. 5. To develop an understanding about the Separation of total proteins by PAGE and visualize protein bands by Coomassie blue staining method
6	Course Outcomes	CO1: Identify standard operating procedures for laboratory equipments. CO2: Estimate free drug and drug-conjugates by spectrophotometry. CO3: Isolate and separate DNA (by electrophoresis) from animals pre-treated with drugs. CO4: Prepare drug-conjugates and purify by column chromatography. CO5: Separate total proteins by PAGE and visualize protein bands by Coomassie blue staining method.

		CO6: Design and conduct an experiment.
		CO7: Analyze experimental results and communicate data through writing.
7	**Course Description**	To Plan and carry out the experiment and to learn methods of cell isolation from tissues and determine enzyme activity and inhibition of different proteins. Design and conduct the experiment.
8	**Outline syllabus**	
	Unit 1	Basics about Plant Cell Culture
	Unit 2	To Prepare the material required for various cell culture practices in sterile conditions
		To Prepare serum from the given blood sample
	Unit 3	Purify DNA and separate DNA by agarose gel electrophoresis.
		To prepare desired medium for the plant culture
	Unit 4	Conduct an experiment to detect glucose from given sample.
	Unit 5	To prepare permanent slide using the given section like stem, root and leaf
		To grow organic Lemon/rose artificially
	Mode of Examination	Practical/Viva

	Weightage Distribution	CA	MTE	ETE
		60%	0%	40%

	Textbook/s*	Freshney R.I., "Culture of Animal Cells: A Manual of Basic Technique", Wiley-Liss, 2005.
	Other References	Boyer R.F., "Biochemistry Laboratory: Modern Theory and Techniques", Prentice Hall, 2011.

SHARDA UNIVERSITY
Beyond Boundaries

BSP303: COMPARATIVE ANATOMY OF VERTEBRATES LAB

School: SOE		**Batch: 2020-24**
Program: B.Sc. B.Ed.		**Current Academic Year: 2022-23**
Branch: Education		**Semester: V**
1	**Course Code**	**BSP 303**
2	**Course Title**	**Comparative Anatomy of Vertebrates Lab**
3	**Credits**	2
4	**Contact Hours (L-T-P)**	0-0-3
	Course Status	Co Requisite
5	**Course Objectives**	1. To appreciate the range and diversity of organisms within the vertebrates. 2. To learn the anatomical characteristic features of all vertebrate classes. 3. To understand the differences in the body systems of the vertebrate species. 4. To comprehend the evolution via comparing vertebrate classes anatomically and physiologically.
6	**Course Outcomes**	After the successful completion of this course students shall be able to: CO1: Know about the integumentary and skeletal system of vertebrates in general. CO2: Understand the digestive and respiratory systems of vertebrates. CO3: Learn about the characteristics features of circulatory and urinogenital systems found in vertebrate species. CO4: Get complete understanding about sense organs. CO5: Understand about the course of embryological development. CO6: To get a complete knowledge about various anatomical, physiological and developmental characteristics of vertebrates.
7	**Course Description**	The aim of this course is to provide better understanding about different species of vertebrates. The student gets acquainted with various characteristic features of vertebrates in context to anatomy and

		development.
8	**Outline syllabus**	
	Unit 1	**Integumentary System & Skeletal System**
	a, b	To study placoid, cycloid and ctenoid scales through permanent slides/photographs
	c	To study disarticulated skeleton of any two: Frog, *Varanus,* Fowl, Rabbit
	Unit 2	**Digestive System & Respiratory System**
	a, b, c	To study the structure of mammalian lung from video recording
	Unit 3	**Circulatory System & Urinogenital System**
	a	To study arterial system of rat
	b, c	To study urinogenital organs of rat
	Unit 4	**Nervous System & Sense Organs**
	a, b	To study the structure of mammalian eye from video recording
	c	To study the structure of mammalian ear from video recording
	Unit 5	**Embryology**
	a, b	To study chick embryo development at any three-time period of its development: 24, 36, 72 and 96 hours
	c	Project work assigned on selected topics
	Mode of examination	Practical/Viva
	Weightage Distribution	CA / MTE / ETE
		60% / 0% / 40%
	Text book/s*	• Verma, Prem Singh. *A Manual of Practical Zoology: Chordates*. S. Chand Publishing, 2000.
	Other References	• Young, J. Z. (2004). The Life of Vertebrates. III Edition. Oxford university press.

		• Pough H. Vertebrate life, VIII Edition, Pearson International.
		• Darlington P.J. The Geographical Distribution of Animals, R.E. Krieger Pub. Co.

SHARDA UNIVERSITY
Beyond Boundaries

BSP304: CHEMISTRY PRACTICAL

School: SOE	**Batch: 2020-24**	
Program: B.Sc.B. Ed	**Current Academic Year: 2022-23**	
Branch: Education	**Semester: V**	
1	**Course Code**	**BSP 304**
2	**Course Title**	**Chemistry Practical**
3	**Credits**	**1**
4	**Contact Hours (L-T-P)**	0-0-2
	Course Status	Co Requisite
5	**Course Objectives**	- To develop the understanding of kinetics of chemical reactions. - To familiarise with the analysis of ores - To prepare and analyse inorganic complexes. - To make the students understand the adsorption phenomena. - To help them understand the effect of solvent structure on the *adsorption* processTo develop the understanding of kinetics of chemical reactions.
6	**Course Outcomes**	After the completion of this course, the students will be able to- CO1: carry out colorimetric analysis to determine the concentration of a chemical element or compound in a solution. CO2: synthesise the coordination compounds and understand the chemical kinetics CO3: use polarimeter to measure the angle of rotation of a sample, reaction rate constant of cane sugar. CO4: understanding the effect of solvent structure on the *adsorption* process CO5: observe, record and explain the effect of change in concentration and temperature of a reactant on the reaction rate.
7	**Course Description**	This course is intended to acquaint the students with the practice of experimental physical chemistry.

8	Course Outlines	
	Unit 1	
	A	• Iodination of Acetone by titration and Colorimetry.
	B	• Acid Hydrolysis of Ester
	C	• Reaction between Potassium Peroxydisulphate and Potassium Iodide.
	Unit 2	
	A	• Base Hydrolysis of an Ester by Titration and Conductometry
	B	• Determination of Copper by colorimetric method using ammonia as the complexing agent. • Colorimetric study of kinetics of oxidation of indigo carmine by Chloromine-T.
	C	• Determination of Ferric ion by colorimetric method using potassium thiocyanate as the complexing agent.
	Unit 3	
	A	• Preparation of a complex: potassium trioxalato aluminate (III) trihydrate or potassium trioxalatocobaltate (III)
	B	• To determine the rate constant for the inversion of sucrose using polarimeter.
	C	• Solvolysis of Tertiary Butyl Chloride by Titrimetry, conductometry and pH metry.
	Unit 4	
	A	• Inversion of Cane Sugar
	B	• To study the adsorption of acetic acid on activated charcoal
	C	• To determine the relative strength of Hydrochloric acid and sulphuric acid by studying the kinetics of hydrolysis of ethyl acetate.
	Unit 5	

	A	• To study kinetically the reaction rate of decomposition of iodine by hydrogen peroxide.
	B	• Iodine clock reaction
	C	• Estimation of Manganese in pyrolusite by volumetric method

Mode of Examination	Jury+Practical+Viva		

Weightage Distribution	CA	MTE	ETE
	60%	0%	40%

Text books*	•

| Other References | 1. Advanced practical inorganic chemistry by Gurdeep Raj, Goel Publication House

2.Systematic Experiments in chemistry by Arun Sethi, New age International Pvt.Ltd. |
|---|---|

BSP305: SCHOOL ATTACHMENT PROGRAMME & COMMUNITY LIVING

School: SOE		**Batch: 2020-24**
Program: B.Sc. B.Ed.		**Current Academic Year: 2022-23**
Branch: Education		**Semester: V**
1	**Course Code**	**BSP305**
2	**Course Title**	**School Attachment Programme & Community Living**
3	**Duration**	2 weeks
4	**Credits**	2
5	**Contact Hours (L-T-P)**	0-0-4
6	**Course Type**	Pre- Requisite
7	**Course Objectives**	1. The course will enable the people-teachers to – 2. Understand and analyse the functioning of various curricular activities, e.g., sports and games, dance, songs; organized in the school and 3. Understand the perception and role of community members in teaching learning environment.
8	**Course Outcomes**	After the completion of the Course the people- teacher will be able to- CO1.Understand and analyse the functioning of various curricular activities, e.g. sports and games, dance, songs; organized in the school and CO2.Observe and take experience of teaching-learning process in the classroom. CO3.Apply the school experiences in their teaching profession to increase efficiency. CO4.Understand the perception and role of community members in teaching learning environment.
	A	**School Attachment Programme** Duration: 1 week One week School Attachment Programme shall be carried out during the second semester in local/nearby school (s). The students will be allotted schools in the vicinity of the university. Care will be taken to identify various types of school for the programme, e.g. Government, Private, Urban, Rural, Special Schools. During this programme, the student-teachers shall observe: (i) various curricular

		activities, e.g. sports and games, dance, songs; and (ii) the teaching-learning process in the classroom, ICT use, student participation, classroom management. The student-teachers shall observe curricular activities for which they may use observation schedules. The institute shall develop these schedules; and orient the student-teachers on the process of observation as well as use of the schedules. At the end of the programme, student-teachers shall be required to develop a detailed report and share the same in a seminar/meeting at the Institute.
	B	**Community Living** Duration: 1 week Student-teachers shall be provided exposure to community life for at least one week during which they shall spend time with the community members and act in terms of preparing school development plan, sharing cultural practices, holding cultural programmes and gaining community perception about and aspirations from formal education system. At the end of this programme, the student-teachers shall prepare a detailed report of the programme, individually and/or in group.

Note-MOOCs-Chemistry -Credits-3

SEMESTER VI

BSI308: CLASSICAL & QUANTUM MECHANICS AND SPECIAL THEORY OF RELATIVITY

School: SOE	Batch: 2020-24
Program: B.Sc.B.Ed	Current Academic Year: 2022-23
Branch: Education	Semester: VI

1	Course Code	BSI308
2	Course Title	Classical & Quantum Mechanics and Special Theory of Relativity
3	Credits	4
4	Contact Hours (L-T-P)	4L+ 0T +0P
	Course Status	Core
5	Course Objectives	1. To enable students to understand the essentials of 2. Classical mechanics, 3. Quantum mechanics, 4. Quantum statistics 5. Relativity 6. Experiments the wave properties of matter.
6	Course Outcomes	After the completion of this course, the student will be able to CO1: understand the basic concepts of classical mechanics, constraints, oscillations and Lagrange's equations CO2: describe and understand the motion of a mechanical system using Lagrange-Hamilton formalism. CO3: demonstrate an understanding of the basic principles of the special theory of relativity, explain true nature of Lorentz transformation and Doppler effect. CO4: describe the origin and need of quantum physics CO5: solve the Schrödinger equation and describe the properties of a particle in simple potential wells. CO6: be able to discuss and interpret experiments that reveal the wave properties of matter, as well as how this motivates replacing classical mechanics with a wave equation.
7	Course Description	This course gives an elementary introduction to quantum physics, which is

necessary to describe a phenomenon such as black-body radiation and the photoelectric effect. It helps to develop a more formal quantum mechanics and learn how to perform calculations on simple systems using the Schrödinger equation. Finally, it discusses the uses of quantum mechanics to describe phenomena such as tunnelling, the properties of atoms and molecules, as well as some elementary nuclear and particle physics.

8	**Outline Syllabus**	
	Unit 1	**CLASSICAL MECHANICS - I**
	A	- Constraints- sclerenomic and rheonomic constraints, holonomic and non-holonomic constraints, generalized co-ordinates and velocities.
	B	- Principle of virtual work, D'Alembert's principle, Euler- Lagrange equations, cyclic co-ordinates.
	C	- Conservation laws and symmetryproperties, applications of Lagrangian formulation (simple pendulum).
	Unit 2	**CLASSICAL MECHANICS - II**
	A	- Canonical momenta & Hamiltonian of a system.
	B and C	- Hamilton's equations of motion. Hamiltonian… for a harmonic oscillator
	Unit 3	**SPECIAL THEORY OF RELATIVITY**
	A	- Galilean transformation, Earth as an inertial frame of reference, Constancy of speed of light, Ether hypothesis, Michelson-Morley experiment Postulates of Special Theory of Relativity, Lorentz transformations. Simultaneity and order of events. Length contraction, Time dilation.
	B	- Relativistic addition of velocities. Variation of mass with velocity.
	C	- Massless Particles. Mass-energy Equivalence. Relativistic Doppler Effect.
	Unit 4	**ORIGIN OF QUANTUM THEORY**

A		• Qualitative discussions on inadequacies of Classical Physics– black body radiation and photoelectric effect, Planck's hypothesis and explanation of black body radiation,
B		• Einstein's explanation of photoelectric effect with derivation, Wave-particle duality, de Broglie's hypothesis of matter waves, concept of group velocity and phase velocity and their Relationship.
C		• Experimental evidence for matter waves– Davisson and Germer experiment, electron diffraction experiment. Uncertainty Principle.
Unit 5		**DEVELOPMENT AND APPLICATION OF SCHRODINGER EQUATION**
A		• Wave function, interpretation of wave function
B		• Postulates of quantum mechanics, probability density, Eigen functions and Eigen values, expectation values, Normalization of wave functions, development of time dependent and time independent Schrodinger wave equation, operator method of deriving Schrodinger equation.
C		• Applications of Schrodinger wave equation– one dimensional infinite potential well, finite potential well, phenomenon of tunnelling.

Mode of Examination	Theory		
Weightage Distribution	CA	MTE	ETE
	30%	20%	50%

References	
	1. Arthur Beiser, Perspectives of Modern Physics, McGraw-Hill Inc.,US; International edition edition.

2. H.Goldstein, C.P. Poole, J.L. Safko, Classical Mechanics 3rd Edn., Pearson Education,

3. L. D. Landau and E. M. Lifshitz, Mechanics, Pergamon, 1976.

4. P.S. Joag, N.C. Rana, Classical Mechanics 1st Edn., McGraw Hall.

5. R. D. Gregory, Classical Mechanics, Cambridge University Press, 2015. |

		6. L. I. Schiff, Quantum Mechanics, 3rd Edn., Tata McGraw Hill, 2010. 7. R. Shankar, Principles of Quantum Mechanics 2nd edition, Springer, 2014. 8. David J Grififth, Introduction to Quantum Mechanics, Addison Wesley; 2 edition, 2004. 9. P. M. Mathews and K. Venkatesan, A Text book of Quantum Mechanics, 2nd edition, McGraw Hill, 2010. 10. R. Eisberg and R. Resnick, Quantum Mechanics, 2nd edition, Wiley, 2002. 11. G. Aruldhas, Quantum Mechanics, 2nd edition, PHI Learning of India, 2002. 12. C. Reed, Quantum Mechanics, Jones and Bartlett Learning, 2008.	
•	• Text book/s*	• Pittaway, L. and Cope, J. (2003). Entrepreneurship education: a systematic review of evidence. International Small Business Journal, 25, 479-510. • Dana, L. P. (2001). "The education and training of entrepreneurs in Asia." Education+ Training 43(8/9): 405-416 • Palatsingh, T. Entrepreneurship education in India: Need for Policy Interventions	
•	• REFERENCES	• Aditya Roy and Kaushal Mukherjee, "Entrepreneurial Education in India," International Journal of Advanced Engineering and Management, Vol. 2, No. 1, pp. 15-20, 2017. • D. F. Kuratko, "The Emergence of Entrepreneurship Education: Development, Trends, and Challenges," Entrepreneurship Theory and Practices, vol. 29, no. 5, pp. 577-598, 15 August 2005.	

BSI309: PLANT SYSTEMATICS

School: SOE	Batch: 2020-2024
Program: B. Sc. B. Ed.	Current Academic Year:2022-23
Branch: Education	Semester: VI
1	Course Code	BSI309
2	Course Title	Plant Systematics
3	Credits	4
4	Contact Hours (L-T-P)	4-0-0
	Course Status	Core
5	Course Objective	This course is designed to make students learn and understand 1. The fundamental knowledge of taxonomy 2. Classification in plants. 3. Elaborates sequential classification associated with taxonomy in plants 4. Comprehensive view of botanical nomenclature. 5. identification methods, nomenclature, taxonomic hierarchy of plants and analyze the phylogeny of angiosperms
6	Course Outcomes	After the successful completion of this course students will be able to: CO1: Explain the procedure, methods and elements of plants identification CO2: Describe the botanical nomenclature terminologies, principle and rules CO3: Recall the scientist concept of plants classification in ancient and modern methods CO4: Describe the concepts of taxonomic hierarchy categories, biometrics and numerical taxonomy CO5: Analyze the phylogeny of angiosperms. CO6: Explain identification methods, nomenclature, taxonomic hierarchy of plants and analyze the phylogeny of angiosperms
7	Course Description	The 'Plant systematics' course outlines the basic classification of plants and their role in events of systematics. This course sheds light upon the detailed taxonomic

hierarchy. The course also further defines various important phenomena related to phylogeny of angiosperms.

8	**Outline syllabus**	
	Unit 1	**Identification**
	A	Field inventory; Functions of Herbarium
	B	Important herbaria and botanical gardens of the world and India;
	C	Virtual herbarium E-flora; Documentation: Flora, Monographs, Journals; Keys: Single access and Multi-access
	Unit 2	**Botanical nomenclature**
	A	Principles and rules (ICN); Ranks and names; Typification
	B	Author citation, valid publication, rejection of names
	C	Principle of priority and its limitations; Names of hybrids
	Unit 3	**Systems of classification**
	A	Major contributions of Theophrastus, Bauhin, Tournefort, Linnaeus, Adanson, de Candolle, Bessey, Hutchinson, Takhtajan and Cronquist
	B	Classification systems of Bentham and Hooker (upto series) and Engler and Prantl (upto series)
	C	Brief reference of Angiosperm Phylogeny Group (APG III) classification.
	Unit 4	**Taxonomic hierarchy**
	A	Concept of taxa (family, genus, species); Categories and taxonomic hierarchy.
	B	Categories and taxonomic hierarchy.
	C	Species concept (taxonomic, biological, evolutionary).
	Unit 5	**Biometrics, numerical taxonomy**
	A	Characters; Variations; OTUs
	B	Character weighting and coding
	C	Cluster analysis: Phenograms, cladograms (definitions and differences)
	Mode of examination	Theory

Weightage	CA	MTE	ETE
Distribution	30%	20%	50%

Text book/s*	1. ***Plant Systematics:* Theory and Practice**. Singh, (2012). Oxford & IBH Pvt. Ltd., New Delhi. 3rd edition. 2. ***An IntroductiontoPlant Taxonomy***. Jeffrey, C. (1982). Cambridge University Press, Cambridge.
Other References	1. ***Plant Systematics-A Phylogenetic Approach***. Judd, W.S., Campbell, C.S., Kellogg, E.A., Stevens, P.F. (2002). Sinauer Associates Inc., U.S.A. 2nd edition. 2. ***Flora of Delhi***. Maheshwari, J.K. (1963). CSIR, New Delhi.

BSI 310: ORGANIC CHEMISTRY - II

School: SOE	Batch: 2020-24
Program: B.Sc. B.Ed.	Current Academic Year: 2022-23
Branch: Education	Semester: VI

1	Course Code	BSI310
2	Course Title	**Organic Chemistry - II**
3	Credits	4
4	Contact Hours (L-T-P)	4L+ 0T +0P
	Course Status	Core
5	Course Objectives	To develop an understanding of 1. The chemistry of Functional groups 2. Mechanism of Organic Reactions 3. The fundamental properties and reactivity of biologically important molecules (e. g. amines and nitrogen). 4. The systematic chemistry of alcohols, phenols, carbonyl compounds, carboxylic acid, amines, carbanions 5. The fundamental properties and reactivity of biologically important molecules (e.g. amines and nitrogen compounds
6	Course Outcomes	After the completion of this course, the students will be able to CO1: to describe the structure and properties of various types of alcohols, nomenclature and methods of formation of phenols. CO2: to describe the nomenclature, structure, properties and methods of formation of compounds containing carbonyl group. CO3: explain the preparation and reaction of carboxylic acid compounds and their derivatives. CO4: understand and appreciate the mechanism of synthesis of organic compounds using carbonions.

		CO5: understand the fundamental properties and reactivity of biologically important molecules (e.g. amines and nitrogen compounds)
7	**Course Description**	This course reviews the basic principles of chemical bonding as they apply to organic molecules and are introduced to the concepts of functional groups, nomenclature, stereochemistry, and reaction mechanisms. The systematic chemistry of alcohols, phenols, carbonyl compounds, carboxylic acid, amines, carbanions are discussed
8	**Outline Syllabus**	
	Unit 1	**ALCOHOLS AND PHENOLS**
	A	• **Monohydric alcohols**: Nomenclature, methods of formation (reduction of aldehydes, ketones, carboxylic acids and esters). Hydrogen bonding, acidic nature, reactions of alcohols (oxidation, esterification, dehydration)
	B	• **Phenols**: Nomenclature, structure and bonding, Preparation of phenol, Physical properties and acidic character of phenol. Comparative acidic strengths of alcohols and phenols, resonance stabilization of phenoxide ion.
	C	• Reactions of phenols: Electrophilic aromatic substitution, acylation and carboxylation. Mechanisms of Fries rearrangement, Claisen rearrangement, Gatterman synthesis, Houben-Hoesch reaction and Reimer-Tiemann reaction.
	Unit 2	**CARBONYL COMPOUNDS**
	A	• Nomenclature and structure of carbonyl group,
	B	• synthesis of aldehydes and ketones with particular reference to the synthesis of aldehydes from acid chlorides, synthesis of aldehydes and ketones using 1,3-dithianes, synthesis of ketones from nitriles and from carboxylic acids
	C	• . Physical properties, Mechanism of nucleophilic addition to carbonyl group with particular emphasis on benzoin, aldol, Perkin and Knoevenagel condensations. Baeyer-Villiger oxidation of ketones, Cannizzaro reaction.

	Unit 3	**CARBOXYLIC ACIDS AND THEIR DERIVATIVES**
	A	• Nomenclature, structure and bonding. Preparation of carboxylic acids – by oxidation, using Grignard reagents and hydrolysis of nitriles.
	B	• Physical properties, acidity of carboxylic acids, effect of substituents on acid strength.
	C	• Reactions of carboxylic acids: HVZ reaction, synthesis of acid chlorides, esters and amides. Reduction of carboxylic acids. Mechanism of decarboxylation.
	Unit 4	**ORGANIC SYNTHESIS VIA CARBONIONS**
	A	• Synthesis of ethyl acetoacetate by Claisen condensation and diethyl malonate, acidity of α –hydrogens, alkylation of diethyl malonate and ethyl acetoacetate.
	B	• Synthetic applications of malonic ester: succinic acid, adipic acid, crotonic acid, cinnamic acid and barbituric acid.
	C	• Synthetic applications of acetoacetic ester: succinic acid, adipic acid, crotonic acid and cinnamic acid, antipyrine, uracil and acetyl acetone, keto-enol tautomerism of ethyl acetoacetate. Alkylation of 1,3-dithianes, Alkylation and acylation of enamines.
	Unit 5	**ORGANIC COMPOUNDS OF NITROGEN**
	A	• Nitro Compounds: Introduction, Preparation of nitroalkanes and nitroarenes. Mechanism of nucleophilic substitution in nitroarenes and their reductions in acidic, neutral and alkaline media.
	B	• Aliphatic and Aromatic amines: Structure and nomenclature of amines, Preparation of alkyl and aryl amines (reduction of nitro compounds, nitrites), reductive amination of aldehydic and ketonic compounds. Gabriel-phthalimide reaction, Hofmann bromamide reaction.
	C	• Reactivity, physical properties, stereochemistry of amines. Distinction between 1°, 2°and 3°amines with Hinsberg reagent and nitrous acid. Structural features effecting basicity of amines. Synthetic transformations of aryl diazonium salts and azo coupling.

Mode of Examination	Theory		
Weightage Distribution	CA	MTE	ETE
	30%	20%	50%

Other References	1. Advanced organic chemistry Arun Bahl and B.S. Bhal 2. Organic Chemistry: Reagents and Reactions Agrawal, Goel Publishing House 53rd edition 2015 3. Organic Chemistry John Macmumy 9th Edition 2016. 4. 4. Organic Chemistry J.Clayden, N. Greeves and S.Warren 2nd Edition 2012 Oxford University Press.	

BSI 311: GROUP AND RINGS

School: SOE	**Batch: 2020-24**	
Program: B.A.B. ED	**Current Academic Year: 2022-23**	
Branch: Education	**Semester: VI**	
1	**Course Code**	**BSI311**
2	**Course Title**	**Group and Rings**
3	**Credits**	5
4	**Contact Hours (L-T-P)**	4-1-0
	Course Status	Core
5	**Course Objectives**	1. Developing an understanding special classis of rings and to appreciate modern mathematical concepts. 2. To developing a theoretical understanding of Dihedral groups, Normal subgroups, Quotient groups. 3. To develop fundamental theorem of Homomorphism, Cauchy's theorem for abelian groups, Permutation group. 4. To develop an understanding of characteristic equation of a square matrix, Eigen values and Eigen vectors. Including a real symmetric matrix, Diagonalization of a real symmetric matrix, Cayley. Hamilton.
6	**Course Outcomes**	CO1Explain the special classes of rings and to appreciate modern mathematical concepts CO2Discuss the theoretical perspective of Dihedral groups, Normal subgroups, Quotient groups. CO3Elaborate upon the theorem of Homomorphism, Cauchy's theorem for abelian groups, Permutation group. CO3Discuss characteristic equation of a square matrix, Eigen values and Eigen vectors. Including a real symmetric matrix, Diagonalization of a real symmetric matrix, Cayley.
7	**Course Description**	This course covers special classes of rings, modern mathematical concepts, Dihedral groups, Normal subgroups, Quotient groups, and fundamental theorem of Homomorphism, Cauchy's theorem for abelian groups, Permutation group and equation of a square matrix, Eigen values and Eigen vectors. Including a real symmetric matrix, Diagonalization of a real symmetric matrix, Cayley.
8		
	Unit 1	

	A	Groups, Examples, Properties and types,
	B	Co sets, Sub-groups. Cyclic groups and properties,
	C	Lagrange's theorem and its Consequences,
	Unit 2	
	A	Dihedral groups, Normal subgroups, Quotient groups.
	B	Homomorphism and Isomorphism of groups,
	C	Kernel of a Homomorphism.
	Unit 3	
	A	Fundamental theorem of Homomorphism, Cauchy's theorem for abelian groups, Permutation group,
	B	Alternating Group, Cayley's Theorem.
	C	Rings, Integral Domains, Division Rings, Fields, Properties, Field of quotients. Ideals,
	Unit 4	
	A	Quotient rings Maximal, Prime and Principal ideals, Principal ideal ring, Divisibility in an Integral domain
	B	Homomorphism of a ring, Kernel, Isomorphism, Fundamental theorem of Homomorphism,
	C	Polynomial rings, Divisibility, Irreducible polynomials, Division Algorithm, Greatest
	Unit 5	
	A	System of m-linear equations in n-unknowns, Matrices associated with linear equations,
	B	Trivial and non-trivial solutions, Criterion for existence of non-trivial solution of homogeneous and non- homogeneous systems and their uniqueness.
	C	Characteristic equation of a square matrix, Eigen values and Eigen vectors. inding a real symmetric matrix, Diagonalization of a real symmetric
	Mode of Examination	Theory

		CA	MTE	ETE
	Weightage Distribution	30%	20%	50%

	Text books*	• Theorem and its applications.

BSI312: ANIMAL BIOTECHNOLOGY

School: SOE	Batch: 2020-2024	
Program: B.Sc. B.Ed.	Current Academic Year: 2022-23	
Branch: Education	Semester: VI	
1	Course Code	BSI 312
2	Course Title	Animal Biotechnology
3	Credits	4
4	Contact Hours (L-T-P)	4-0-0
	Course Status	Core
5	Course Objective	1. To understand the methods for the isolation of animal cell from organ and tissues and development of cell lines. 2. To know the types of media used for the growth of animal cell culture and advantages and disadvantages of the media used for their growth. 3. To know the sub-culturing methods of animal cell lines and large-scale production of cell lines. 4. To know about stem cell culture technology and application of stem cell culture for human welfare. 5. Different methods for the production of transgenic animal and their use to improve human welfare in Agriculture, medicine and industry.
6	Course Outcomes	After successfully completion of this course students will be able to: CO.1 Know about the techniques for the isolation of animal cell from organ and tissues and development of animal cell lines. CO.2 Know about the cell culturing method by using the different types of media and the advantages and disadvantages of the media used for culturing of the animal cell lines. CO.3 Know about the various types of method used for the cloning of animal cell lines and transfection method the production and transgenic animals. They will also know about the risk associated with gene cloning. CO.4 Know stem cell culture technology and application of stem cell culture for human welfare. CO.5 Different methods for the production of transgenic animal and their use to

		improve human welfare in agriculture, medicine and industry.
7	**6**	**Course Outcomes**
	Unit 1	**Introduction to Animal Cell Culture**
	A	Structure and organization of animal cell; sources of cell.
	B	Techniques of obtaining cells by disaggregation of tissues, Enzymatic disaggregation, EDTA treatment.
	C	Types of cell culture; Equipment's required for animal cell culture.
	Unit 2	**Development of Cell Lines**
	A	Medium preparations and its various types Natural, artificial serum protein free media Advantages and disadvantages;
	B	sub culturing techniques, viable cell counts with hemocytometer
	C	Types of cell lines, development of cell lines their characteristics; suspension culture advantages & disadvantages, totipotency in animal cell culture.
	Unit 3	**Animal Cell Cloning**
	A	Cloning, types of cell cloning methods of cloning;
	B	Transfection; methods, retro-virus mediated gene transfer, embryonic stem cell-mediated gene transfer
	C	artificial twining, risk of cloning cloned animals
	Unit 4	**Stem Cell Culture Technology**
	A	Stem cell technology- concept
	B	Hematopoiesis
	C	Methods to study repopulation assay
	Unit 5	**Application of Stem Cell Culture Technology**
	A	In-vitro cloning assay
	B	Long term culture, embryonic stem cell culture.
	C	Application of stem cell culture.
	Modeof examination	Theory

Weightage Distribution	CA	MTE	ETE
	30%	20%	50%

Text book/s*	1. Freshney I.R., "Culture of Animal Cells: A Manual of Basic Technique", Wiley, 2005.
Other References	Jenkins N., "Animal Cell Biotechnology: Methods and Protocols", Humana Press, 2006. Shenoy M., "Animal Biotechnology", Laxmi Pub, 2007. Freshney I.R., "Culture of Animal Cells: A Manual of Basic Technique", Wiley, 2005

SHARDA UNIVERSITY
Beyond Boundaries

SEB 109: PEDAGOGY OF PHYSICAL SCIENCE

School: SOE	Batch: 2020—2022
Program: B.Sc. B.Ed.	Current Academic Year: 2020-21
Branch: Education	Semester: VI
1	Course Code	SEB109
2	Course Title	**Pedagogy of Physical science**
3	Credits	4
4	Contact Hours (L-T-P)	4-0-0
	Course Type	Core
5	Course Objectives	The course will enable the students to - 1- Understand Pedagogical Foundations of physical sciences 2-Analyse the Classroom processes 3- Provide knowledge about Teaching- Learning Resources and assessment
6	Course Outcomes	After the completion of the Course the student teacher will be able to- CO1- Explain the pedagogical foundations of physical sciences. CO2- Understand the classroom processes CO2- Acquaint the knowledge about teaching knowledge processes. CO4- Apply the assessment tools and measurements. CO5- Conduct laboratory work efficiently.
7	Course Description	The science which deals with the study of physical objects is called Physical science. To teach this subject, whatever methods and strategies are required are included in this paper. It will enable pupil teachers to understand the process of teaching physical sciences.
8		
	Unit 1	Pedagogical Foundations
	A	Place of science in school curriculum.
	B	The concept of Pedagogical Content Knowledge (PCK) and its implications for science

		teaching.
	C	Aims of teaching science at the upper-primary and secondary level; Objectives of teaching science with special reference to the development of thinking and process skills
	Unit 2	Classroom processes
	A	Pedagogical planning: considerations in relation to content (curriculum and concepts) and learners (with specific reference to socio-cultural and developmental context of the learner including special needs).
	B	A repertoire of teaching-learning processes: Inquiry based approach, inductive and deductive approach, experimentation, demonstration, discussion, investigatory projects, individually paced programmes, group work, peer learning, observation-based survey, problem solving, guided independent study, seminar presentation, action research
	C	Developing unit plans, lesson plans and Remedial/Enrichment plans using combinations of various processes; Planning for conduct of science, experiments and laboratory work with a critique of the current practices
	Unit 3	Teaching- Learning Resources
	A	Criteria for selecting/designing Teaching-Learning Resources: content based, learner based and context based; Textbook, reference books, encyclopedia, newspaper and alike.
	B	Instructional aids, computer aided instruction in science, multi-media packages, interactive software, websites, open Educational Resources (OER) etc.
	C	Planning of extended experiences, science quiz, science fair, science corner/resource room, science club, excursion and related SUPW activities.
	Unit 4	*Assessment*
	A	*Nature of learning and assessment, analysis and critique of the present pattern of examinations.*
	B	*Design and analysis of Formative assessment tasks and Summative Assessment*
	C	*Assessment of laboratory work and project work, Assessment through creative expression-drawing, posters, drama, poetry, etc as part of formative assessment for continuous assessment of thinking and process skills*
	Unit 5	**Practicum**
	A	Organization of the science Laboratory; Layout and design of the science laboratory, Storage of apparatus etc.
	B	Developing Teaching-Learning resources
	C	Improvisations and Science Kits

Mode of examination	Theory		
Weightage Distribution	CA	MTE	ETE
	30%	20%	50%
Suggested Readings*	1. Heiss, Oburn and Hoffman: Modern Science, the Macmillan Company, New York 1961. 2. Thurber W. and A. Collette: Teaching Science in Today's Secondary schools, Boston Allyan and Bacon Inc., New York, 1959. 3. Vaidya, N. "The Impact of Science Teaching", Oxford and IBH Publishing Company, New Delhi, 1971. 4. Richardson, S.: "Science Teaching in Secondary Schools", Prentice Hall, USA, 1957. 5. Sharma, R.C. and Shukla: "Modern Science Teaching" Dhanpat Rai and Sons, Delhi, 2002. 6. Ravi Kumar S.K., "Teaching of Science", Mangal deep Publications 2000. 7. RaoAman: Teaching of Physics, Anmol Publications, New Delhi, 1993. 8. Wadhwa Shalini: Modern Methods of Teaching Physics, Sarup and Sons, New Delhi,2001. 9. Gupta S.K.: Teaching Physics Sciences in Secondary Schools, Sterling Publishers (P) ltd., New Delhi, 1989.		

SEB115: PEDAGOGY OF MATHEMATICS

School: SOE	Batch: 2020-22
Program: B.Ed.B.Ed.	Current Academic Year: 2020-21
Branch:	Semester: VI

1	Course Code	**SEB 115**
2	Course Title	**Pedagogy of Mathematics**
3	Credits	4
4	Contact Hours (L-T-P)	4-0-0
	Course Type	Core
5	Course Objective	The course has the following Objectives: 1. To Comprehend the aims and objectives of teaching Mathematics 2. To appreciate the historical development in general and contribution of Indian Mathematician in particular. 3. To determine the aims and objectives and EBO's of pedagogy of Mathematics. 4. To acquire skills of teaching mathematics and develop competence in structuring lesson plans. 5. To Explore and apply methods and strategies of teaching mathematics in classroom situations. 6. To Integrate and organise mathematics curriculum 7. To use various techniques to evaluate student's performance. 8. To Critically analyse the textbooks of mathematics 9. To understand the need and avenues for professional development.
6	Course Outcomes	On the completion of this course, the pupil-teachers will be able to- CO1: Understand the background of Mathematical as a subject. CO2: Develop knowledge about the mathematical thinking. CO3: Use the Innovative Pedagogy of Mathematics. CO4: Develop insight for Mathematics to be used as Equity and Social Justice CO5: Analyze mathematics classrooms and develop understanding about mathematics as a subject.
7	Course Description	This course emphasizes upon developing competencies and skills in **mathematics** at the primary and upper primary stage children through learner-friendly **pedagogy** that integrates assessment and also engage all children with different abilities in a stress-free classroom environment.
8	Outline syllabus	C

			C M a p p i n g

	Unit 1	**Introduction to Mathematical Thinking**	
	A	Mathematics as study of creating, discerning and generalizing patterns: Identifying and analyzing abstract patterns, patterns of shapes, patterns of motion, patterns of repeating chance, numerical patterns.	
	B	Understanding Mathematics as a humanly created subject: Creating Mathematical structures: idea of axioms, postulates and proofs, what is a proof? Different methods of proofs: direct proof, indirect proof, counter examples, proof by induction.	
	C	Socio-cultural, economic and political factors in the development of mathematics. Everyday mathematics, multicultural mathematics; its use in decision making, at the workplace, etc., Societal beliefs related to 'knowing' and 'doing' mathematics. Critically challenging the sociological beliefs related to mathematical abilities, mathematics confined to arithmetic.	
	Unit 2	**Introduction to Mathematical Thinking**	
	A	Mathematics as study of creating, discerning and generalizing patterns: Identifying and analysing abstract patterns, patterns of shapes, patterns of motion, patterns of repeating chance, numerical patterns.	
	B	Understanding Mathematics as a humanly created subject: Creating Mathematical structures: idea of axioms, postulates and proofs, what is a proof? Different methods of proofs: direct proof, indirect proof, counter examples, proof by induction.	
	C	Socio-cultural, economic and political factors in the development of mathematics. Everyday mathematics, multicultural mathematics; its use in decision making, at the workplace, etc.	
	Unit 3	**Innovative Pedagogy of Mathematics**	
	A	Culture of learning- Creating dynamic classroom environments; sharing and exploring ideas, encouraging diverse and innovative procedures, using multiple ways to solve problems, making conjectures, seeking generalizations; respecting diverse capabilities; use of context; metacognition.	
	B	Role of Communication in classroom- Math talk; building a community of mathematicians in classrooms; constructing mathematical ideas by providing scope for exploration, explanation and evaluation of children's work,Use of resources, activities, story-telling and technology in initiating mathematical thinking	

C	Notions related to mathematical 'ability'; promoting growth mindset, depth versus speed; math anxiety, Teacher's beliefs and knowledge about the nature of mathematics and mathematical learning, teachers 'agency in school math reform.	
Unit 4	Mathematics for Equity and Social Justice	
A	Why teach 'mathematics to all'? –Concerns and challenges	
B	Issues of gender, class and culture in mathematics learning and achievement - Expectations, attitudes and stereotypes; access to higher mathematics; interrogating the notion of 'achievement gap'; construction of learners 'identity in a mathematics classroom	
C	Addressing the concerns of societal as well as mathematical equity.	
Unit 5	Practicum	
A	Analysis of books, folk games, and other resource materials	
B	Classroom observations and analysis of mathematics classrooms	
C	Use and setting up of a mathematics lab Development of manipulatives, games, low-cost activity materials	

Mode of examination	Theory/Jury/Practical/Viva		
Weightage Distribution	CA	MTE	ETE
	30%	20%	50%

Suggested Readings *	1. Aggarwal, S.M. (1999). Teaching of Modern Mathematics, DhanpatRai and Sons, New Delhi.
	2. Sidhu, K.S. (1998). The Teaching of Modern Mathematics, Sterling, New Delhi.
	3. Davis, D.R. (1951). The Teaching of Mathematics. London: Addison Wesclyh Press.
	4. Kulshrestha, A. K. (2007). Teaching of Mathematics. Meerut: R. Lall Book Depot.
	5. Mangal, S. K. (2007). Teaching of Mathematics. New Delhi: Arya Book Depot.
Other References	1- York: McGraw-Hill Book Company.
	2- Shankaran& Gupta, H. N. (1984). Content-cum-Methodology of Teaching Mathematics.New Delhi: NCERT

SEB 116: PEDAGOGY OF BIOLOGICAL SCIENCE

School: SOE	Batch: 2020—2022
Program: B.Sc.B.Ed.	Current Academic Year: 2020-21
Branch: Education	Semester: VI

1	Course Code	SEB116
2	Course Title	**Pedagogy of Biological Science**
3	Credits	4
4	Contact Hours (L-T-P)	4-0-0
	Course Type	Core
5	Course Objectives	The course will enable the students to - 1- Understand Pedagogical basis of physical sciences. 2- Analyse the Classroom processes for teaching of Biological Sciences. 3- Provide knowledge about Teaching- Learning Resources usable for pedagogy of Biological Science. 4-Apply the concepts and measures of assessment in the teaching of Biological Sciences.
6	Course Outcomes	After the completion of the Course the student teacher will be able to- CO1- Explain the pedagogical basis of biological sciences. CO2- Understand the classroom processes related with Pedagogy of Biological Sciences. CO3- Acquaint the knowledge about teaching learning resources. CO4- Apply the assessment tools and measurements. CO5- Develop the skill of conducting practical aspects of Biology.
7	Course Description	The science which deals with the study of living objects is called Biology. Thus, the subject involves the studies of all kinds of micro-organisms, plants and animals. Biology is related to mankind ever since the origin of man; therefore, this branch of science stands first in order of studies as compared to other branches of science. Ever since the origin of life man is eager to know about various phenomenon of life processes such as health and disease, birth, growth and death. However, man depends on plants and animals for food, shelter and clothing which are immediate needs of life, come from Biology. Perhaps it was the elementary need of man to know about the living beings, so that maximum benefits can be drawn out of them. Though biology

		involves study of life, but now a days it is mostly centralized with the study of agriculture, animal husbandry, health and microbiology and related branches. Today study of any branch of science is not possible in isolation as it also involves principles of physics, chemistry and various other branches.
8		
	Unit 1	**Pedagogical basis**
	A	Place of Biology in school curriculum and its changing character
	B	The concept of Pedagogical Content Knowledge (PCK) and its implications for Biology teaching.
	C	Aims of teaching Biology at the senior secondary level with linkages to upper-primary and secondary level. Objectives of teaching Biology with special reference to the development of thinking and process skills.
	Unit 2	Classroom processes
	A	Pedagogical planning: considerations in relation to content (curriculum and concepts) and learners (with specific reference to socio-cultural and developmental context of the learner including special needs).
	B	Repertoire of teaching-learning processes: Inquiry based approach, inductive and deductive approach, experimentation, demonstration, discussion, investigatory projects, individually paced programmes, group work, peer learning, observation-based survey, problem solving, guided independent study, seminar presentation, action research
	C	Developing unit plans, lesson plans and Remedial/Enrichment plans using combinations of various processes, Planning for conduct of activities, experiments and laboratory work in Biology with a critique of the current practices.
	Unit 3	Teaching- Learning Resources
	A	Criteria for selecting/designing Teaching-Learning Resources: content based, learner based and context based., Textbook, reference books, encyclopedia, newspaper and alike
	B	Instructional aides, computer aided instruction, multi-media packages, interactive software, websites, Open Education Resources (OER) etc.
	C	Planning of extended experiences, science quiz, science fair, science corner/resource room, science club, excursion and related SUPW activities.
	Unit 4	Assessment
	A	Nature of learning and assessment, analysis and critique of the present pattern of examinations.
	B	Design and analysis of Formative assessment tasks and Summative, Assessment,

		Assessment of laboratory work and project work.
	C	Assessment through creative expression-drawing, posters, drama, poetry, etc as part of formative assessment for continuous assessment of thinking and process skills, Developing learner profiles and portfolios; participatory and peer assessment.
Unit 5		Practicum
	A	Improvisations and Science Kits
	B	Developing Teaching-Learning resources.
	C	Preparation of a detailed Assessment Report of learners' continuous and comprehensive assessment
Mode of examination		Theory/Jury/Practical/Viva

Weightage Distribution	CA	MTE	ETE
	30%	20%	50%

Suggested Readings*			

1. Aggarwal, D. D. (2008). Modern Method of Teaching Biology, Karanpaper Books. New Delhi.
2. Anderson, R.D. (1992). Issues of Curriculum Reform in Science, Mathematics and Higher Order Thinking Across the Disciplines: The Curriculum U.S.A: University of Colorado.
3. Bremmer, J. (1967). Teaching Biology, Macmillan, London.
4. Buffaloe, N. and Throneberry, J.B. (1972). Principles of Biology, University Press, New Delhi: Prentice- Hall of India Ltd.
5. &Robert, S. (1989). Teaching Modern Science (5th edition). U.S.A: Merill Publishing Co.
6. Green, T.L. (1965). The Teaching of Biology in Tropical Secondary Schools, London: Oxford University Press.
7. E.D., Obourn. S., & Hoffman. C.W. (1985) Modern Science Teaching. New Delhi: Sterling Publishing (Pvt) Ltd. MacMillan Company Press.
8. Heiss, Obourn., & Hoffman. (1985) Modern Science in Secondary Schools. New Delhi: Sterling Publishing Private Ltd.
9. Pandey, (2003). Major Issues in Science Teaching. New Delhi: Sumit Publications.
10. Passi, B.K. (1976). Becoming a Better Teacher: Micro Teaching Approach, Ahmadabad: Sahitya Mudranalaya.
11. Patton, M.Q. (1980). Qualitative Evaluation Methods. New Delhi: Sage Publications.
12. Sharma, R.C. (2006). Modern Science Teaching. New Delhi: Dhanpat Rai Publications.

| | | 13. Siddifit, S. (1985). Teaching of Science Today and Tomorrow. New Delhi: Doaba's House. |
| | | 14. Yadav, M.S. (2003) Teaching of Science. New Delhi: Anmol Publications. |

BSP306: PHYSICS PRACTICAL

School: SOE	Batch: 2020-24
Program: B.Sc. B. Ed.	Current Academic Year: 2022-23
Branch: Education	Semester: VI

1	Course Code	BSP306
2	Course Title	Physics Practical
3	Credits	1
4	Contact Hours (L-T-P)	0-0-2
	Course Status	Co Requisite
5	Course Objectives	1. To provide training in the broad methodology of science through investigatory type and open-ended laboratory exercises. 2. To validate the theoretical basis of the experiments.
6	Course Outcomes	1. To conduct practical through investigatory type and open-ended laboratory exercises. 2. To understand the theoretical basis of the experiments.
8		
	Unit 1	
	A	• Stefan's constant. • Planck's constant using LED's (3no.s).
	B	• Absorption spectra.
	C	• Photoelectric effect.
	Unit 2	
	A	• Variation of resistance with temperature of copper wire (10 mts).
	B	• Laser Diffraction.

	C	• Laser-wavelength using transmission grating.
	Unit 3	
	A	• Photo conductivity using LDR.
	B	• Photovoltaic cells.
	C	• Numerical aperture of an optical fibre by semiconductor laser
	Unit 4	
	A	• Ballistic Galvanometer Absolute Capacity. • Ballistic Galvanometer -High resistance by leakage method
	B	• Ballistic Galvanometer Mutual inductance
	C	• e/m of electron.
	Unit 5	
	A	• Verification of inverse square law for light using photodiode.
	B	• Diffraction of light. Determination of wavelength
	C	• Characterization of photo diode.
	Mode of Examination	Jury+Practical+Viva

Weightage Distribution	CA	MTE	ETE
	60%	0%	40%

References	1. B.L.Flint & H.T.Worsnop, Advanced Practical Physics for students, Asia Publishing House, 1971. 2. E Armitage, Practical Physics, John Murray. 3. PSSC Physics Laboratory Guide. 4. S.Panigrahi & B.Mallick, Engineering Practical Physics, Cengage

Learning India Pvt.

Ltd., 2015

5. Indu Prakash and Ramakrishna, A Text Book of Practical Physics, 11th Edition, Kitab

Mahal, New Delhi, 2011.

6. Jerry D Wilson and Cecilia A. Hernández-HallPhysics Laboratory Experiments7th

Edition, Cengage Learning, 2009.

7. S.Panigrahi & B.Mallick, Engineering Practical Physics, Cengage Learning India Pvt.

Ltd., 2015.

8. Michael Nelson and Jon M. Ogborn, Advanced level Physics Practicals, 4th Edition,

reprinted, Heinemann Educational Publishers, 1985.

BSP307: PLANT SYSTEMATICS LAB

School: SOE	**Batch: 2020-24**	
Program: B.Sc B.Ed.	**Current Academic Year: 2022-23**	
Branch: Education	**Semester: VI**	
1	**Course Code**	**BSP307**
2	**Course Title**	**Plant Systematics Lab**
3	**Credits**	2
4	**Contact Hours (L-T-P)**	0-0-3
	Course Status	Co Requisite
5	**Course Objectives**	1. To Study and recognize vegetative and floral characters 2. Describe a specimen scientifically so as to identify it 3. To learn Mounting of a properly dried and pressed specimen of any wild plant with herbarium label
6	**Course Outcomes**	After successfully completion of this course students will be able to: CO1: Recognize vegetative and floral parts and know their correct names CO2: Describe a specimen appropriately CO3: Identify and indicate the demarcating feature of the specimen CO4: Trace the specimen to family based on the character CO5: Make floral diagrams correctly Write the floral formula correctly CO6: Mount a properly dried and pressed specimen of any wild plant
7	**Course Description**	Plant Systematics Lab Course introduces the students to step by step process of plant identification. During the lab work the students will be acquainted with various typical identifying features of common families. This course makes them aware of the varied but important demarcating features. Students are trained in the techniques of dissecting, mounting, preserving plant samples.
8	**Outline syllabus**	
	Unit 1	**Practical based on identification of morphological character**
		Sub unit - a,
	Unit 2	**Practical related to Study of a member of Asteraceae**
		Sub unit - a,
	Unit 3	**Practical related to Study of a member of Solanaceae**
		Sub unit - Instructional Plan
	Unit 4	**Practical related to Study of a member of Apocynaceae**

	Sub unit - a, b and c detailed in Instructional Plan		
Unit 5	**Practical related to Study of a member of Malvaceae**		
	Sub unit - a, b and c detailed in Instructional Plan		
Unit 1	**Practical related to field visit and herbarium preparation**		
	Sub unit - a		
Weightage Distribution	CA	MTE	ETE
	60%	0%	40%
Text book/s*	Practical Taxonomy of Angiosperms, 2015, R. K. SinhaIKI publishing House		

List of Practical's:

Week 1	Unit 1	**Practical based on identification of morphological characters**	
Week 1-2	a,b,c	Lab expt.1	To study and identify the leaf morphology and their nomenclature
Week 3		Lab expt.2	To study the floral structure and their nomenclature
	Unit 2	**Practical related to Study of a member of Asteraceae**	
Week 4	a,b,c	Lab expt.4	To study the characteristics of Sonchusoleraceus.
Week 5		Lab expt.5	To study the characteristics of Helianthusannuus.
	Unit 3	**Practical related to Study of a member of Solanaceae**	
Week 6	a,b,c	Lab expt.6	To study the characteristics of Daturametel.
	Mid term		
	Unit 4	**Practical related to Study of a member of Apocynaceae**	
Week 7	a,b,c	Lab expt.7	To study the characteristics of Nerium *oleander*.
Week -8		Lab expt.8	To study the characteristics of Catharanthus *roseus*.
	Unit 5	**Practical related to Study of a member of Malvaceae and herbarium preparation**	
Week 9	a,b,c	Lab expt.9	To study the characteristics of Althearosea

BSP308: ANIMAL BIOTECHNOLOGY LAB

School: SOE	Batch: 2020-24
Program: B.ScB.Ed	Current Academic Year: 2022-23
Branch: Education	Semester: VI

1	Course Code	BSP308
2	Course Title	Animal Biotechnology Lab
3	Credits	2
4	Contact Hours (L-T-P)	0-0-3
	Course Status	Co Requisite
5	Course Objective	1. To understand the methods for the isolation of animal cell from organ and tissues and development of cell lines. 2. To know about the different types of media used for the growth of animal cell culture.
6	Course Outcomes	After the successful completion of this course students will be able to: CO1: To know about the various sterilization techniques. CO2: To understand the basics of animal cell culture. CO3: To know about the various methods used to check cell viability. CO4: To learn the method of cell preservation. CO5: To get a better understanding about DNA isolation from animal cells. CO6: To get a complete knowledge about various techniques and methodology used in animal biotechnology.
7	Course Description	The aim of this course is to provide better understanding about the practical aspects of animal biotechnology. The student gets acquainted with different experimental techniques and protocols used in animal biotechnology.
8	Outline syllabus	
	Unit 1	Practical related to – Sterilization
	a, b	To learn the working of an autoclave
	c	To sterilize glasswares using hot air oven.

Unit 2	Practical related to – Animal Cell Culture		
a, b	To prepare media for Animal Cell Culture		
c	To perform primary cell culture of tissue		
Unit 3	**Practical related to – Cell Viability**		
a, b	To perform cell passaging & cell viability check by trypan blue method		
c	To perform MTT assay and Micronucleus test		
Unit 4	**Practical related to – Cell preservation**		
a, b, c	To learn the methodology of cryopreservation of animal cells.		
Unit 5	**Practical related to – DNA isolation**		
a, b, c	To perform DNA isolation from cultured animal cells		
Mode of examination	Practical/Viva		
Weightage Distribution	CA	MTE	ETE
	60%	0%	40%
Text book/s*	1. Freshney I.R., "Culture of Animal Cells: A Manual of Basic Technique", Wiley, 2005.		
Other References	1. Jenkins N., "Animal Cell Biotechnology: Methods and Protocols", Humana Press, 2006. 2. Shenoy M., "Animal Biotechnology", Laxmi Pub, 2007.		

List of Practical's:

	Unit 1	**Practical related to – Sterilization**
Week 1	a, b	To learn the working of an autoclave
Week 2	c	To sterilize glasswares using hot air oven.
	Unit 2	**Practical related to – Animal Cell Culture**
Week 3	a, b	To prepare media for Animal Cell Culture
Week 4	c	To perform primary cell culture of tissue
	Unit 3	**Practical related to – Cell Viability**

Week 5	a, b	To perform cell passaging & cell viability check by trypan blue method
Week 6	c	To perform MTT assay and Micronucleus test
	Unit 4	**Practical related to – Cell preservation**
Week 7	a, b, c	To learn the methodology of cryopreservation of animal cells.
	Unit 5	**Practical related to – DNA isolation**
Week 8	a, b, c	To perform DNA isolation from cultured animal cells

BSP309: CHEMISTRY PRACTICAL

School: SOE	Batch: 2020-24
Program: B.Sc. B. Ed.	Current Academic Year: 2022-23
Branch: Education	Semester: VI

1	Course Code	BSP309
2	Course Title	Chemistry Practical
3	Credits	1
4	Contact Hours (L-T-P)	0-0-2
	Course Status	Co Requisite
5	Course Objectives	1. To develop basic skills of separation of organic compounds and evolve a scheme of analysis of organic compounds based on properties of functional groups for identification. 2. To develop skills of separation techniques
6	Course Outcomes	CO1: detect and analyse the organic compounds qualitatively. CO2: separate the organic mixtures containing water. CO3: detect the extra elements and functional groups present in simple organic compounds. CO4: analyze the mixtures by separating the compounds in the mixture and determine their Rf value using TLC, paper chromatography and column chromatography.
7	Course Description	This course aims at correlating the theory of organic chemistry with its practical aspect. It involves developing a scheme of analysis of organic compounds and the techniques used for their separation.
8		
	Unit 1	
	A, B and C	• Qualitative organic analysis (**2-3 practicals**)
	Unit 2	
	A, B and C	• Separation of organic mixtures containing two solid components using water, $NaHCO_3$, NaOH (**3 practicals**)
	Unit 3	
	A, B and C	• Analysis of an organic compound: Detection of extra elements (N, S and X) and functional groups (phenolic, carboxylic, carbonyl, esters, carbohydrates, alcohols, amines, amides, nitro and anilides) in simple

		organic compounds. **(2-3 practicals)**
	C	• Identification of 170 organic compound based on functional group analysis, determination of physical constant (mp / bp).
Unit 4		**Chromatographic Techniques: Thin Layer Chromatography**
	A	Determination of Rf values and identification of organic compounds and
	B	Identification of plant pigments by thin layer chromatography
	C	(a) Separation of mixture of dyes (b) Preparation and separation of 2,4-dinitrophenylhydrazones of acetone / 2-butanoneusing toluene: light petroleum (2:3 ratio)
Unit 5		**Chromatographic Techniques: Paper Chromatography:**
	A	• Determination of Rf values and identification of organic compounds (a)Separation of mixture of amino acids or
	B	• Separation of mixture of D-galactose and D-fructose using n-butanol:aceticacid:water 4:5:1) ; Spray reagent: anilinehydrogenphthalate.
	C	• Column Chromatography: Separation and identification of ortho and para nitro anilines
Mode of Examination		Jury+Practical+Viva

Weightage Distribution	CA	MTE	ETE
	60%	0%	40%

Text books*	• A Text Book of Qualitative Organic Analysis, A I Vogel • A Text Book of Quantitative Organic Analysis, A I Vogel
Other References	• Systematic experiments in Chemistry Arun Sethi, New Age International(P) Ltd.

SEMESTERVII

SEP201: PRE-INTERNSHIP

School: SOE	Batch: 2020--2024
Program: B.Sc. B.Ed.	Current Academic Year: 2023-24
Branch: Education	Semester: VII
1	**Course Code**	**SEP201**
2	**Course Title**	**Pre-Internship**
3	**Credits**	2
4	**Contact Hours (L-T-P)**	0-0-2
	Course Type	Co Requisite
5	**Course Objectives**	The course will enable the student-teachers to –Acquire necessary skills for teaching
6	**Course Outcomes**	On the completion of this course, the pupil-teachers will be able to- CO1- Understand the process of teaching and learning. CO2: Acquire skills for teaching effectively. CO3: Make lesson plan of their respective teaching subjects.
7	**Course Description**	The pre-internship will be of one week duration during which necessary orientation programmes towards school internship will be organized in the institute. The following activities shall be organized during pre-internship phase:
		• Discussion on unit planning, lesson planning, blueprint and unit tests, achievement test, CCE etc.

		• Discussion on records to be maintained by student-teachers during internship.
		• Demonstration of lessons in each subject by the experts/supervising teacher followed by discussion
		• Demonstration of criticism Lessons by the experts/supervising teacher followed by discussion.
		• Observation of at least 2 lessons, by the student-teachers, of their peers in each subject followed by discussion.
	Mode of examination	Viva

SHARDA UNIVERSITY
Beyond Boundaries

SEP 208: INTERNSHIP: PEDAGOGY OF SCHOOL SUBJECT-I

School: SOE	Batch: 2020--2024
Program: B.Sc. B.Ed.	Current Academic Year: 2023-24
Branch: Education	Semester: VII

1	Course Code	SEP 202
2	Course Title	Internship: Pedagogy of School Subject –I
3	Credits	5
4	Contact Hours (L-T-P)	-
	Course Type	INTERNSHIP
5	Course Objectives	The course will enable the student-teachers to –Acquire necessary skills for teaching
6	Course Outcomes	On the completion of this course, the pupil-teachers will be able to- CO1. Understand the process of teaching and learning. CO2. Acquire skills for teaching effectively. CO3. Make lesson plan of their respective teaching subjects.
7	Course Description	Every student teacher shall undergo an internship of 15 weeks in an identified school. During this period the student teacher shall be attached to a school and he/she shall undertake such duties as are assigned to him / her by the Head Master/Principal of the school in all school related activities. During this period, he/she shall teach at least 80 periods in the school, taking equal number of lessons from each of his/her pedagogy subjects, under the supervision of teachers and respective teacher educators. The first week will be utilized for developing rapport with school (Students, teachers Principal/Head Master/other staffs, etc.) Student-teachers shall engage with students of Upper Primary/ Secondary/ senior secondary classes during internship. Pedagogy of Physical Science Pedagogy of Commerce Pedagogy of Hindi Pedagogy of English
	Student-teachers shall perform the following during internship:	
	1.	Simulated Lesson Plan (5 Lesson Plans each in pedagogy of School Subject I

		and pedagogy of School Subject II)
	2.	Discussion Lessons Plan (2 Lesson Plans each in pedagogy of School Subject I and pedagogy of School Subject II) (best of the two lessons in each pedagogy course will be evaluated)
	3.	Total 52 Lesson Plans (25 lesson plans in each pedagogy course and 1 lesson plan through the use of multimedia in each pedagogy course)
	4.	Achievement Test Report (ATR) (In one pedagogy subject only)
	5.	Use of Teaching-Learning Material in Classroom Discourse (including teaching aids and reference material) (5 teaching aids each in pedagogy of School Subject I and pedagogy of School Subject II)
	6.	Peer Group Observation (10 observations)
	7.	Preparing Portfolios
	8.	Organising and maintaining the records of school activities.
	9.	Maintaining a Reflective Diary

SEP 209: INTERNSHIP: PEDAGOGY OF SCHOOL SUBJECT –II

School: SOE	Batch: 2020--2024
Program: B.Sc. B.Ed.	Current Academic Year: 2023-24
Branch: Education	Semester: VII

1	Course Code	SEP203
2	Course Title	Internship: Pedagogy of School Subject –II
3	Credits	5
4	Contact Hours (L-T-P)	-
	Course Type	INTERNSHIP
5	Course Objective	The course will enable the student-teachers to – Acquire necessary skills for teaching
6	Course Outcomes	On the completion of this course, the pupil-teachers will be able to- CO1- Understand the process of teaching and learning. CO2: Acquire skills for teaching effectively. CO3: Make lesson plan of their respective teaching subjects.
7	Course Description	Every student teacher shall undergo an internship of 15 weeks in an identified school. During this period the student teacher shall be attached to a school and he/she shall undertake such duties as are assigned to him / her by the Head Master/Principal of the school in all school related activities. During this period, he/she shall teach at least 80 periods in the school, taking equal number of lessons from each of his/her pedagogy subjects, under the supervision of teachers and respective teacher educators. The first week will be utilized for developing rapport with school (Students, teachers Principal/Head Master/other staffs, etc.). Student-teachers shall engage with students of Upper Primary/ Secondary/ senior secondary classes during internship.

		Pedagogy of Economics
		Pedagogy of Social Sciences
		Pedagogy of Mathematics
		Pedagogy of Biological Science
	Student-teachers shall perform the following during internship:	
	1.	Simulated Lesson Plan (5 Lesson Plans each in pedagogy of School Subject I and pedagogy of School Subject II)
	2.	Discussion Lessons Plan (2 Lesson Plans each in pedagogy of School Subject I and pedagogy of School Subject II) (best of the two lessons in each pedagogy course will be evaluated)
	3.	Total 52 Lesson Plans (25 lesson plans in each pedagogy course and 1 lesson plan through the use of multimedia in each pedagogy course)
	4.	Achievement Test Report (ATR) (In one pedagogy subject only)
	5.	Use of Teaching-Learning Material in Classroom Discourse (including teaching aids and reference material) (5 teaching aids each in pedagogy of School Subject I and pedagogy of School Subject II)
	6.	Peer Group Observation (10 observations)
	7.	Preparing Portfolios
	8.	Organizing and maintaining the records of school activities.
	9.	Maintaining a Reflective Diary

SEP204: ENGAGEMENT WITH THE FIELD: TASKS AND ASSIGNMENTS RELATED TO INTERNSHIP

School: SOE	Batch: 2020--2024	
Program: B.Sc. B.Ed.	Current Academic Year: 2023-24	
Branch: Education	Semester: VII	
1	Course Code	SEP 204
2.	Course Title	Engagement with the Field: Tasks and Assignments related to internship
3.	Credits	4
3	Contact Hours (L-T-P)	0-0-2
5	Course Type	Internship
6	Course Objective	The course will enable the student-teachers to – 1- Understand the various tasks to be performed as a teacher in a school. 2- Acquire necessary skills for performing other activities in a school.
6	Course Outcomes	On the completion of this course, the pupil-teachers will be able to- CO1. Develop the understanding of activities organized in school. CO2. Acquire the required skills of conducting various activities in school by engaging in school activities
7	Course Description	During School Internship period, in addition to teaching pedagogy subject's student-teachers will be required to engage in following activities and maintain a record of same - • Organize and participate in: • Morning assembly • Literary and cultural activities • Club activities

		- Exhibitions - Excursions and fieldtrip - Mock parliament - Quiz - Games and sports - PTA/SMC meetings - Maintaining the respective records - Maintaining a reflective diary - Case study of a student - Reflective Journal
	Records to be submitted -	
		- Lesson plans/ Unit plans - School profile: infrastructure; Social Science Laboratory - physical facilities, Equipment, School Library- facilities - Record of Participation/organization of school activities - Achievement Test Report - Assessment record (CCE) - School timetable

MOOCs-SWAYAM-Maths / Zoology- Credits-3

VIII SEMESTER

SEB 201: GENDER SCHOOL AND SOCIETY

School: SOE		**Batch: 2020—2024**
Program: B.Sc. B.Ed.		**Current Academic Year: 2023-24**
Branch: Education		**Semester: VIII**
1	**Course Code**	**SEB 201**
2	**Course Title**	**Gender School and Society**
3	**Credits**	3
4	**Contact Hours (L-T-P)**	3-0-0
	Course Type	Compulsory
5	**Course Objectives**	The course will enable the People-teachers - 1. To develop reflective thinking on different theories of Gender and Education and relate it to power relations. 2. To sharpen the perception about the institutions involved in Socialisation processes and see how socialization practices impact power relations and identity formation 3. To understand the gender issues in school, curriculum, textual materials across disciplines and pedagogical processes. 4. To critically evaluate the legal provisions for women, the issues relating to implementation of legislation and women's access to justice. 5. To enhance the skill of critical analysis of media.
6	**Course Outcomes**	On the completion of this course, the pupil-teachers will be able to CO1. Analyze different thoughts and theories of Gender and relate it to power relations CO2. Explain the role of the institutions involved in Socialisation processes and see how socialization practices impact power relations and identity formation. CO3. To comment upon the gender issues in school, curriculum, textual

		materials across disciplines and pedagogical processes CO4. Describe the legal provisions for women. CO5. Critically analyze the issues relating to implementation of legislation and women's access to justice. CO6. Debate on role of media in creating and disseminating the concept of gender.
7	Course Description	For a truly egalitarian and democratic society, there is a need to have empowered & informed citizens. This course aims to develop basic understanding and familiarity with concept of Gender and its intersection with class, caste, religion and region. It also intends to make aware about the process of socialization at home and school. The Course will help in creating awareness and understanding of laws dealing with aspects of gender. It plays a crucial role in identifying structural inequalities and bridging the gap between the formal legal regime and the implementation of progressive laws across the societies
8		
	Unit 1	**Gender, School and Society**
	A	Gender Patriarchy, power, resources and opportunities, sex
	B	A brief introduction to feminist theories: radical, liberal, psychoanalyst, socialist and Marxist.
	C	Different Schools of feminist thought in the Indian contest- National and regional feminist thoughts.
	Unit 2	**Gender Socialization**
	A	Social Construction of Gender Socialization in the family and at school, occupation and identity (identities largely unavailable to women such as farmer, scientist etc.) stereotypes about girls and women prevalent in the society, media and literature
	B	Gender and its intersection with poverty, caste, class, religion, disability, and region (rural, urban and tribal areas)
	C	Essentialized male and female identities and the introduction to third gender; discourse of LGBT
	Unit 3	**Gender and School**

	A	Girls as learners, hidden curriculum (teacher attitudes, expectations and peer culture)
	B	Epistemological Issues in mathematics, social sciences and life sciences using gender as a lens, subject choice made in Grade XI and its relation with gender
	C	Gendered representations in textbooks (illustrations and text), policy interventions in school education, construct of gender in national curriculum frameworks, teacher in India: an analysis using gender as a lens.
	Unit 4	**Legislation and Gender Justice**
	A	Protective legislation for women in the Indian constitution- Anti dowry, SITA, PNDT, and Prevention Sexual Harassment at Workplace (Visaka case), Domestic violence (Prevention) Act
	B	Reservation for Women
	C	Supreme Court Verdict about transgender (Section 377 of the Indian Penal Code (IPC)
	Unit 5	**Practicum**
	A	Analysis of films including songs, advertisements in print and electronic media
	B	A critical study of schemes such as KGBV, NPEGEL, Ladli and so on.
	C	An analytical study of textbooks published by different states, private publishers and NCERT.
	Mode of examination	Theory

	Weightage Distribution	CA	MTE	ETE
		30%	20%	50%

	Text book/s*	- Unterhalther, E (2006) Measuring Gender Inequality in south Asia, London UNICEF - The global gender gap report 2013, World Economic forum, Switzerland - Michael G Pelete, Gender, Sexuality and body politics in modern asia, Ann Arbor MI : Association for Asian Studies, 2011

- Victoria A Velk Off (October, 1998), Women of the world: women's education in india U.S.> Dept. Of Com. Retrieved 25 Dec. 2006
- H.D. Report for 2012, U. N. Dev Projects Retrieved 31 March 2014.
- NCERT (2006): Gender Issues in Education, National focus Group, Position paper, NCERT, New Delhi.

- Chanana, Karuna. 1988 Socialization, Education and Women. Nehru Memorial Museum and Library: New Delhi
- Dube, Leela. 2000 Anthropological Explorations in Gender: Intersecting Fields. Sage Publications: New Delhi
- Dube, Leela 1997. Women and Kinship: Comparative Perspectives on Gender in South and South-East Asia (New York: United Nations University Press)
- Beasley, Chris. 1999. What is Feminism: An Introduction to Feminist Theory. Sage: New Delhi
- Conway, Jill K., et al. 1987. 'Introduction: The Concept of Gender', *Daedalus*, Vol. 116, No. 4, Learning about Women: Gender, Politics, and Power (Fall): XXI-XXX
- Engineer, Asghar Ali. 1994. 'Status of Muslim Women', *Economic and Political Weekly*, Vol. 29, No. 6 (Feb.): 297-300
- Erikson, Erik H. 1964. 'Inner and Outer Space: Reflection on Womanhood', *Daedalus*, Vol.93, No.2, The Woman in America (Spring): 582-606
- Ganesh, K. 1994. 'Crossing the Threshold of Numbers: The Hierarchy of Gender in the Family in India', *Indian Journal of Social Science*, 7(3 & 4): 355-62
- Ganesh, K. 1999. 'Patrilineal Structure and Agency of Women: Issues in Gendered Socialization' in T. S. Saraswathi (ed.), *Culture, Socialization and Human Development* Delhi: Sage Publication India

		Pvt. Lt
		• Gardner, Carol Brooks. 1983. 'Passing By: Street Remarks, Address Rights, and the Urban Female', *Sociological Inquiry* 50: 328-56
		• Gilligan, Carol. 1982. In a Different Voice England: Harvard University Press
		• Government of India. 1975 a. *Towards Equality: Report of the Committee on the Status of Women in India* (Delhi: Department of Social Welfare, Government of India)
		• Government of India. 1994.The Girl Child and the Family: An Action Research Study. Department of Women and Child Developmen*t* Delhi: HRD Ministry, Government of India
		• Hasan, Zoya and Menon, Ritu.. 2005. Educating Muslim Girls: A Comparison of Five Indian Cities Delhi: Women Unlimited
		• Kumar, Krishna. 2010. 'Culture, State and Girls: An Educational Perspective' *Economic and Political Weekly* Vol. XLV No. 17 April 24
		• Kumar, Krishna. 2013 *Choodi Bazar Mein Ladki.* Rajkamal: New Delhi
		• Patel, Tulsi. 2007.'Female Foeticide, Family Planning and State-Society Intersection in India' in Tulsi Patel (ed.), *Sex- Selective Abortion in India* Delhi: Sage Publications
		• Ridgeway, Cecilia L. and Correll, Shelley J. 2004. 'Unpacking the Gender System: A Theoretical Perspective on Gender Beliefs and Social Relations', *Gender and Society*, Vol. 18, No. 4 Aug.
		• West, Candace and Zimmerman, Don H. 1987. 'Doing Gender', *Gender and Society*, Vol. 1, No. 2 Jun.: 125-151
	Other References	• Ramachandran, Vimala (2004), Genders and social equality in Education, Hierarchies of Access, Sage, New DelhUNESCO (2003), EFA Global Monitoring Report, Gender and Education for all, The leap to quality.

SEB202: CREATING AN INCLUSIVE SCHOOL

School:	SOE	Batch: 2020-24
Program: BSc. B.Ed.		Current Academic Year: 2023-24
Branch: Education		Semester: VIII
1	Course Code	SEB 202
2	Course Title	Creating an Inclusive School
3	Credits	3
4	Contact Hours (L-T-P)	3-0-0
	Course Type	Compulsory
	Course Objectives	1. Develop Understanding of the nature, needs and functional assessment of learners with reference to diverse needs. 2. Sharpen their perception of the various Policies and legislative frameworks for promotion of the inclusive education. 3. Enhance their capacity to critically reflect over various practices of the Schools Preparedness for Inclusion 4. Critically evaluate and systematically reflect upon various inclusive practices to promote Inclusion in the classroom
6	Course Outcomes	On the completion of this course, the pupil-teachers will be able to: CO1- Explain the critical thinking process in relation to the concept of Inclusive Education. CO2- Analyse the nature, of learners and act to meet their diverse needs. CO3-Describe various Policies and legislative frameworks for promotion of the inclusive education. CO4-Examine various practices of the Schools Preparedness for Inclusion. CO5-Interpret various inclusive practices to promote Inclusion in the classroom.
8	Outline syllabus	
	Unit 1	Inclusive Education
	A	Understanding diversities; Social, Cultural, Cultural, linguistic and Economic.

	B	Understanding disabilities; Visual, Hearing, Mental Retardation, Locomotors, neurological disorders and multiple disabilities
	C	Concept, need and scope of inclusive education, Education of All Movement, and Inclusive Education (A Journey from segregation to inclusion)
	Unit 2	**Children with Special Needs**
	A	Range of learning problems across various disabilities
	B	Assessment of learning problems in children with various disabilities.
	C	Assistive devices, equipment and technologies for different disabilities.
	Unit 3	**Legislative frameworks and Programmes**
	A	National Policy on education 1986
	B	Rehabilitation council of India act 1992
	C	National policy on disabilities 2006 and international instruments like UNCRPD
	Unit 4	**School's Preparedness for Inclusion**
	A	School organization and management: Ideology, infrastructures
	B	Introducing gender in school for achieving gender equality: Curriculum inputs, Textbooks, Student – teacher interactions
	C	Support services available in the school to facilitate inclusion: Role and functions of the following personnel: - Special Education Teacher - Audiologist cum Speech Therapist - Physiotherapist - Occupational Therapist, Counsellor
	Unit 5	**Inclusive Practices in the Classroom**
	A	Making Learning more meaningful- Responding to special needs by developing strategies for differentiating content, curricular adaptations, lesson planning and TLM.
	B	Pedagogical strategies to respond to individual needs of students: Cooperative Learning strategies in the classroom, Peer tutoring, Social Learning, Buddy system, reflective teaching, Multisensory teaching

	C	Provisions pertaining to appearing in examination for facilitating differently abled students (As available in CBSE and ICSE), CCE and its implications to facilitate inclusion
	Mode of examination	Theory/Jury/Practical/Viva

	Weightage Distribution	CA	MTE	ETE
		30%	20%	50%

	Text book/s*	- Montogomary, D (1990) Special need in ordinary school; children with learning difficulties, Cassel Educational Limited, London. - GOI (1986), National policy of Education, Ministry of Education, New Delhi. - Bhargva M (1994), Introduction to exceptional children, sterling Publishers, New Delhi. - Daniels, Harry (1999), Inclusive Education, Kogan, London. - Das. M, Education of exceptional children, Atlantic Publisher, New Delhi. - Dessent, T (1987), Making ordinary school special, Kingsley Publication, Jessica. - Mangal SK, Education of Exceptional Children, PH 1, New Delhi. - Mathew, S (2004) Education of children with hearing impairment, RCI, Kanishka Pub., New Delhi.
	Other References	- Panda, K C (1997), Education of Exceptional Children: An introduction to special Education, Vikash Publishing House, New Delhi. - Uday Shankar, Exceptional children, sterling publishers, New Delhi.

BSI401: NUCLEAR AND PARTICLE PHYSICS

School: SOE	Batch: 2020-24
Program: B.Sc. B.Ed.	Current Academic Year: 2023-24
Branch: Education	Semester: VIII

1	Course Code	BSP401
2	Course Title	Nuclear and Particle Physics
3	Credits	2
4	Contact Hours (L-T-P)	2L+ 0T +0P
	Course Status	Elective
5	Course Objectives	To introduce the concepts and methods in nuclear and particle Physics
6	Course Outcomes	After the completion of this course, the student will be able to CO1: explain external and internal properties of the atomic nucleus. CO2: describe basic models of the atomic nucleus. CO3: explain the different forms of radioactivity and account for their occurrence CO4: master relativistic kinematics for computations of the outcome of various reactions and decay processes CO5: describe the astrophysical processes leading to nuclear synthesis account for the fission and fusion processes CO6: state radiation detectors and accelerators and classify elementary particles according to their quantum numbers and draw simple reaction diagrams
7	Course Description	The course gives an overview of modern nuclear and particle physics, stressing fundamental concepts and processes, methods of measurement and applications within other sciences and technology.

8	Outline Syllabus	
	Unit 1	ATOMIC NUCLEUS
	A	• Nuclear structure, Failure of proton-electron hypothesis– neutron, its discovery and properties, Proton-neutron hypothesis, Constituents of nucleus and their Intrinsic properties, Basic properties of nucleus– charge, spin, radii, mass, magnetic moment. Nuclear forces and their characteristics, Yukawa's Theory (Qualitative)
	B and C	• Packing fraction and binding energy, average binding energy and its variation with mass number, main features of binding energy versus mass number curve, nuclear stability, Segre chart.
	Unit 2	NUCLEAR MODELS
	A	• Nuclear Models– Liquid drop model approach, semi empirical mass formula and significance of various terms, condition of nuclear stability. Two nucleon separation energies,
	B	• Fermi gas model (degenerate fermion gas, nuclear symmetry potential in Fermi gas),
	C	• evidence for nuclear shell structure, nuclear magic numbers, basic assumption of shell model
	Unit 3	RADIOACTIVITY
	A	• Review: Radioactive decay – Half life, mean life, Activity-decay constant. Radioactivedisplacement laws. Theory of a decay, α-emission, Gamow factor. Geiger-Nuttal law. Beta decay, energy kinematics for Beta decay, positron emission Beta spectra. Neutrino hypothesis, K electron capture, internal conversion,
	B and C	• Gamma decay, pair production, successive disintegration, units of radio activity, radioactive dating

Unit 4	NUCLEAR ENERGY
A, B and C	• Uncontrolled and controlled chain, reactions, nuclear fission and fusion. Energy liberated in nuclear fission, energy production in stars, nuclear reactors.
Unit 5	**PARTICLE PHYSICS**
A	• Particle Accelerators and Detectors: Cockcroft– Walton voltage multiplier, LINAC, Cyclotron, Betatron.
B	• Nuclear Detectors: GM counter, scintillation detector, bubble chamber, principle of semi-conductor detector.
C	• Particle Physics: Particles and anti-particles, Classification of particles, Symmetries and Conservation Laws, Qualitative introduction to quarks, Structure of hadrons.

Mode of Examination	Theory/Jury/Practical/Viva		
Weightage Distribution	CA	MTE	ETE
	30%	20%	50%
Text books*	Subramanyam and Brijlal, Atomic and Nuclear Physics, S. Chand & Company Ltd. 2013.		
Other References	1. I. Kaplan, Nuclear Physics, Narosa, 2002. 2. Kenneth S. Krane, Introductory nuclear Physics, Wiley India Pvt. Ltd., 2008. 3. Bernard L. Cohen, Concepts of nuclear physics, Tata McGraw Hill, 1998. 4. R.A. Dunlap, Introduction to the physics of nuclei & particles, Thomson Asia, 2004. 5. Arthur Beiser, Perspectives of Modern Physics, McGraw-Hill Inc.,US; International edition. 6. D. Griffith, Introduction to Elementary Particles, John Wiley & Sons, 2008.		

BSI402: PRINCIPLES OF GENETICS

School: SOE		**Batch:** 2020-24
Program: B.Sc. B.Ed.,		**Current Academic Year:** 2023-24
Branch: Education		**Semester: VIII**
1	**Course Code**	**BSP402**
2	**Course title**	**PRINCIPLES OF GENETICS**
3	**Credits**	2
4	**Contact Hours (L-T-P)**	0-0-4
	Course Status	Core
5	**Course Objectives**	Students will be able to 1. To understand basic principles in heredity and inheritance 2. To learn about human chromosome constitution 3. To develop understanding of extension of Mendelian Genetics 4. To reflect upon various genetic techniques.
6	**Course Outcomes**	After the completion of course students will be able to CO1: Define Mendel's Laws of Inheritance CO2: Differentiate between Incomplete dominance and Co-Dominance CO3: Analyze Sex linked and sex influenced characteristics CO4: Compare different genetic techniques CO5: Describe Sex determination process in Man and Drosophila.
7	**Course Description**	This course will impart knowledge about Mendelian inheritance and the human chromosome constitution that would help in applying basic principles of chromosome behavior to disease context. Overall, this course will highlight extension of Mendelian Genetics, dosage compensation, evolution of the concept of gene and its amalgamation with molecular biology and study of genetic diseases
8		
	Unit 1	**Mendelian Genetics**
	A	Mendel Experiments

	B	Principles of inheritance
	C	Incomplete dominance and co-dominance,
Unit 2		**Mendelian Genetics and its Extension**
	A	Multiple alleles, Lethal alleles, Epistasis, Pleiotropy,
	B	Sex-linked characteristics
	C	Sex influenced and sex-limited characters inheritance
Unit 3		**Linkage and Mapping**
	A	Linkage and crossing over
	B	Chromosomal Mapping
	C	Cytological basis of crossing over,
Unit 4		**Recombination**
	A	models of recombination, Recombination frequency as a measure of linkage intensity
	B	Two factor and three factor crosses
	C	Interference and coincidence
Unit 5		**Sex Determination**
	A	Sex Determination
	B	Chromosomal mechanisms of sex determination in Drosophila
	C	Chromosomal mechanisms of sex determination in Man
Mode of Examination	Theory/Jury/Practical/Viva		

Weightage Distribution	CA	MTE	ETE
	30%	20%	50%

Suggested Readings	Gardner, E.J., Simmons, M.J., Snustad, D.P. (2008). Principles of Genetics. VIII Edition. Wiley India •Snustad, D.P., Simmons, M.J. (2009). Principles of Genetics. V Edition. John Wiley and Sons Inc • Klug, W.S., Cummings, M.R., Spencer, C.A. (2012). Concepts of Genetics. X Edition. Benjamin Cummings • Russell, P. J. (2009). Genetics- A Molecular Approach.III Edition. Benjamin

		Cummings • Griffiths, A.J.F., Wessler, S.R., Lewontin, R.C. and Carroll, S.B. Introduction to Genetic Analysis. IX Edition. W. H. Freeman and Co • Fletcher H. and Hickey I. (2015). Genetics. IV Edition. GS, Taylor and Francis Group, New York and London.

SEB203: ENTERPENURSHIP EDUCATION: ENABLING TEACHERS

School: SOE	Batch: 2020—2024
Program: B.Sc. B.Ed.	Current Academic Year: 2023-24
Branch: Education	Semester: VIII

1	Course Code	SEB203
2	Course Title	Entrepreneurship Education: Enabling Teachers
3	Credits	2
4	Contact Hours (L-T-P)	0-0-2
	Course Type	Co-Requisite
5	Course Objective	The course will enable the student-teachers to – 1- Develop better understanding about entrepreneurship. 2- Understands the various dimensions of entrepreneurship. 3- Understand the entrepreneurship related skills and attitude for entrepreneurship. 4- Apply knowledge and skills for entrepreneurship development.
6	Course Outcomes	On the completion of this course, the pupil-teachers will be able to- CO1: Understand the meaning and role of Entrepreneurships CO2: Analyze Entrepreneurships in the context of Teacher, school and curriculum CO3: Develop comprehensive awareness about Polices and development of entrepreneurship CO4: Understand Support system for entrepreneurship-National and regional level CO5: Develop insight about Support system for entrepreneurship-School and community level

Unit 1	Introduction: Meaning and role of Entrepreneurships
A	Entrepreneurship education meaning, types of entrepreneurships
B	New role for teachers
C	New teacher education for new teachers.
Unit 2	Entrepreneurships in the context of Teacher, school and curriculum
A	The entrepreneurial teacher
B	The entrepreneurial School
C	Entrepreneurial thinking aligning with school curriculum, Application of Entrepreneurial thinking for the classroom

Unit 3		**Polices and development of entrepreneurship**
	A	National strategies for Entrepreneurship
	B	Delivering entrepreneurship education.
	C	Teacher education for entrepreneurship education.
Unit 4		Support system for entrepreneurship-National and regional level
	A	Teachers as facilitators of learning for entrepreneurial learning: what is entailed?
	B	National (or regional) support systems.
	C	Continuing Professional Development
Unit 5		Support system for entrepreneurship-School and community level
	A	School level support: Developing entrepreneurial school strategies
	B	Entrepreneurial school leadership
	C	Community networks and partnerships
Mode of Transaction		The course will be transacted in workshop mode through individual and group experiential activities.
Mode of examination		Theory/Jury/Practical/Viva
References		• ECORYS UK Limited. (2011). Entrepreneurship Education: Enabling Teachers as a Critical Success Factor: A report on Teacher Education and Training to prepare teachers for the challenge of entrepreneurship education. Brussels: European Commission- DG Enterprise and Industry. • Abiogu, G. C. (2011, October). Entrepreneurship education: A veritable means of reconstructing tertiary institutions in Nigeria. The 29 Thannual Conference of Philosophy of Education Association of Nigeria (PEAN), Lagos State University, • Adeyemo, S. A. (2009). Understanding and acquisition of entrepreneurial skills: A pedagogical re-orientation for classroom teacher in science education. Journal of Turkish Science Education, 6(3), 57-65. • Altan, M. Z. (2015). Entrepreneurial teaching & entrepreneurial teachers. Journal for Educators, Teachers and Trainers, 6(2), 35–50 • Cankar, F., Deutsch, T., Zupan, B., & Cankar, S. S. (2013). Schools and promotion of ınnovation. Croatian Journal of Education, 15(2), 179-211. • Correia, A. P., Wang, W., & Baran, E. (2010, March). Bringing entrepreneurship into graduate teacher education. Society for Information Technology & Teacher

Education International Conference. San Diego, CA.

- GHK (2011). Order 129: Mapping of teachers' preparation for entrepreneurship education. Framework Contract NoEAC19/06, DG Education and Culture, Final Report. Retrieved from http://www.ab. gov.tr/files/ardb/evt/1_ avrupa_birligi/1_9_politikalar/ 1_9_4_egitim_politikasi / mapping_en.pdf.

- Dahlstedt, M., & Fejes, A. (2017). Educating entrepreneurial citizens: A genealogy of entrepreneurship education in Sweden. *Critical Studies in Education*. doi:10.1080/17508487.2017.1303525

SEB 204: EPC 4: YOGA AND HEALTH EDUCATION

School: SOE	Batch: 2020--2024
Program: B.Sc. B.Ed.	Current Academic Year: 2023-24
Branch: Education	Semester: VIII

1	Course Code	SEB 204
2	Course Title	EPC 4: Yoga and Health Education
3	Credits	2
4	Contact Hours (L-T-P)	0-0-4
	Course Type	Co-Requisite
5	Course Objective	The course will enable the student-teachers to – 1- Understand the importance of Health. 2- Develop awareness about various measures of health being. 3- Apply the skill of yoga in their practical life.
6	Course Outcomes	On the completion of this course, the pupil-teachers will be able to- CO1: Understand the meaning and process of yoga. CO2: Develop understanding about the historical development of yoga. CO3: Explain the need of for better health CO4: Understand the general guidelines for practicing yoga. CO5: Apply the yoga skills in their life for better health.

	Unit 1	Yoga: meaning and initiation
	A	Definitions of Yoga, misconceptions about Yoga. Basis of Yoga
	B	Origin and history of development of Yoga; Psychological aspects leading to origin of Yoga, Yoga in medieval times, Yoga in modern times.
	C	The two schools of Yoga: Raja Yoga and Hatha Yoga, Yogic practices for healthy living.
	Unit 2	Historicity of Yoga as a discipline
	A	Classification of Yoga and Yogic te xts; Yogasūtra of Patañjali ;Haṭha Yoga texts, Relationship between Pātañjala Yoga and Haṭha Yoga
	B	Meditational processes in Pātañjala Yoga Sūtra, Understanding Aṣṭāṅga Yoga of Patañjali
	C	Haṭha Yogic practices Āsanas, Pranayama, eight kumbhakas, Dhāraṇā on five elements, Mudras and bandhas, Ṣaṭkarma, the set of six cleansing techniques
	Unit 3	Need of Yoga for positive health

A	Role of mind in positive health as per ancient Yogic literature, Concept of health, healing and disease: Yogic perspectives,	
B	Concept of health and diseases, Concepts of triguṇa and pañcakoṣa vis-à-vis holistic health, Potential causes of ill health,Yogic principles of healthy living (āhāra, vihāra, ācāra, vicāra),Integrated approach of Yoga for management of health. Stress management through Yoga and Yogic dietary considerations, how stress is alleviated through Yoga? Prāṇa-saṁyamana (canalization of energy dynamics) through dietary considerations, Rationale of Yogic diet.	
C	Stress management through Yoga and Yogic dietary considerations, how stress is alleviated through Yoga? Prāṇa-saṁyamana (canalization of energy dynamics) through dietary considerations, Rationale of Yogic diet.	
Unit 4	Practicum General guidelines for performance of the practice of Yoga for the beginner.	
A	Guidelines for the practice of ṣaṭ kriyās, Guidelines for the practice of āsanas.	
B	Guidelines for the practice of prāṇāyāma, Guidelines for the practice of kriyā Yoga.	
C	Guidelines for the practice of meditation	
Unit 5	Practicum Select Yoga practices for persons of average health for practical Yoga sessions	
A	Standing position, Sitting position, Prone position, Supine position	
B	Kriyās,Mudrās	
C	Prāṇāyāmas	
Mode of examination	Theory/Jury/Practical/Viva	

	Weightage Distribution	CA	MTE	ETE
		30%	20%	50%

Text book/s	• 1. Aruna Goel, (2007). Yoga education: Philosophy and practice, New Delhi: Deep & Deep Publications. • 2. Ashwani Kumar (2015). Yoga: A way of life. New Delhi: Khel Sahitya Kendra. • 3. Aggarwal J. C. (1996), teacher and education in a developing society. New Delhi: Vikas Publishing House. • 4. Dash, B.N. (2004) Trends and issues in Indian education. New Delhi: Dominant Publishers. • Getchell Bud (1992), Physical fitness a way of life, New York: Macmillan publishing company.

References	• NCTE, (2015). Yoga Education: Bachelor of Education Programme. New Delhi: NCTE. • NCTE (2015). Yoga education: Diploma in elementary education, New Delhi: NCTE

SEP 205: UNDERSTANDING THE SELF

School: SOE	Batch: 2020--2024
Program: B.Sc. B.Ed.	Current Academic Year: 2023-24
Branch: Education	Semester: VIII

1	Course Code	SEP 205
2	Course Title	Understanding the Self
3	Credits	2
4	Contact Hours (L-T-P)	0-0-4
	Course Type	Co-Requisite
5	Course Objective	The course will enable the student-teachers to - 1. Gain an understanding of the central concepts in defining self and identity 2. Reflect critically on factors that shape the understanding of self 3. Build an understanding about themselves, i.e., the development of self as a person as well as a teacher. 4. Reflect on one 's experiences, aspirations and efforts towards becoming a humane individual and teacher 5. Develop effective communication skills including the ability to listen, observe etc. 6. Build resilience within themselves to deal with conflicts at different levels and learn to draw upon collective strengths to live in harmony with one's surroundings 7. Appreciate the critical role of teachers in promoting self and students' well-being.

6	**Course Outcomes**	On the completion of this course, the pupil-teachers will be able to-
		CO1. Understand central concepts in defining self and identity
		CO2. Analyze the factors that shape the understanding of self
		CO3. Develop better understanding about themselves, i.e., the development of self as a person as well as a teacher.
		CO4. Acquaint with effective communication skills including the ability to listen, observe etc.
		CO5. Build resilience within themselves to deal with conflicts at different levels and learn to draw upon collective strengths to live in harmony with one's surroundings
		CO6. Evaluate the critical role of teachers in promoting self and students' well-being.
7	**Course Description**	What is self? Is self the experience of internal talk? What characterizes ―self-ness‖? Can identities change? Will the identity of a first generational learner belonging to a family of migrant laborer change when she is identified as a gifted child? What are the influences of parents and peers on the identity of a learner?
		The above questions and many more similar questions trigger the exploration and need to understand the self '. This course provides opportunity to the student-teachers to gain an understanding about their own self both as an individual and as a student-teacher.
		Developing an understanding of the self is essential for an individual to utilise her/his optimal potential for the benefit of one 's own self as well for the society. As individuals in the society student-teachers are integral part of it. As

an integral member of the society an individual has various identities – gender, relational, linguistic, cultural etc. and it is essential to understand and address one's implicit beliefs, stereotypes and prejudices resulting from these identities. The student-teachers need to become aware of their own selves and their identities as well as the political, historical, and socio-cultural forces that shape them. The course thus provides an interdisciplinary view in the development of the understanding of one's own self. This exploration and understanding will enable the student-teachers to develop sensibilities, dispositions, and skills that will help in their personal and professional development and facilitate the personal growth of their students.

8	**Course Outlines**	
	Unit 1	**Understanding of Self**
	A	- Reflections and critical analysis of one's own self and identity - Identifying factors in the development of self and in shaping identity
	B	BuildinganunderstandingaboutphilosophicalandculturalperspectivesofSelf and
	C	Developing an understanding of one's own philosophical and cultural perspectives as a teacher
	Unit 2	**Development of Professional Self and Ethics**
	A	Understanding and sharing one's identity and socio-cultural, historical and political influences in shaping the professional identity
	B	- Exploring, reflecting and sharing one 's own aspirations, dreams, concerns and struggles in becoming a teacher - Reflections on experiences, efforts, aspirations, dreams etc. of peers
	C	Building an understanding about values and professional ethics as a

		teacher to live in harmony with one 's self and surroundings
		• Understanding the role of teacher as facilitator and partner in well-being among learners
	Unit 3	**Role of Teacher in Developing Understanding of Self among Learners**
	A	Reflecting on one's own childhood and adolescent years of growing-up
	B	Facilitating development of awareness about identity among learners
	C	Developing skills of effective listening, accepting, positive regard etc. as a facilitator
	Unit 4	**Practicum (Any two)** • Developing self-awareness as a teacher (individual/group activity) • Exploring the known and unknown self in relation to what one and others know about one self and what others do not know (individual activity) • Reflecting, recording and sharing of critical moments in one 's life (individual activity and presentations) • Reflections on critical moments in the lives of peers (small group activity) • Exploring one's strengths, weaknesses, opportunities and threats (SWOT analysis) • Reflecting on likes, hopes, fears and pleasures through sentence completion exercises (individual activity) • Group activities involving community participation • Practising selected *asanas, pranayam, meditation and yogic kriyas* as

		prescribed in class VI to X syllabus of Health and Physical Education, NCERT.
	Mode of Transaction	The course will be transacted in workshop mode through individual and group experiential activities such as • Personal narratives and storytelling, life stories, group interactions, film reviews to help explore one's self and identity. Student-teachers to engage in varied forms of self-expression such as poetry, painting and creative movements, humour, aesthetic representations, etc. • Sharing of case studies by student-teachers, critical analysis of biographies and presentations, group readings and sessions on stories of different children who are raised in different circumstances and how this affects self and their personal and social identity formation. • Reflective discussions on films/documentaries where the protagonist undergoes trials and finally discovers her/his potential Development of reflective journals/diaries by the student-teachers. • Introduction of Yoga, meditation as one of the important components to enhance student-teachers understanding of body and mind.
	Mode of examination	VIVA
•	• References	• Bhatt, H. The diary of a school teacher. An Azim Premji University Publication. Retrieved from www.arvindguptatoys.com/arvindgupta/diary-school-teacher- eng.pdf • Bhattacharjee, D.K (ed). (2010). Psychology and Education – Indian Perspectives, NCERT, NewDelhi

- Dalal, A.S. (ed) (2001). A Greater Psychology – An Introduction to the Psychological thoughts of Sri Aurobindo. Puducherry, Sri AurobindoAshram

- Delors, J. (1996). Learning the Treasure within –Twenty First Century Education. UNESCO Education CommissionReport.

- Goel, D.R. (2005). Quality Concerns in Education. Centre for advanced study in Education-M. S. University ofBaroda

- Gulati,S.,andPant,D.(2012).EducationforValuesinSchools– AFramework.NCERT, New Delhi

- Krishnamurti, J. (1998) On Self- knowledge. Chennai, Krishnamurti Foundation India.

- Krishnamurti, J. (2000). Education and Significance of Life. Chennai, Krishnamurti Foundation India.

- Mukunda, K.V. (2009). What did you ask at school today? A handbook of child learning, HarperCollins

- Olson, D.R, and Bruner, J.S. (1996). Folk Psychology and folk pedagogy. In D.R. Olson & N. Torrence (Eds.), The Handbook of Education and Human Development (pp.9-27), Blackwell

- Pant, D. and Gulati, S. (2010). Ways to Peace – A Resource Book for Teachers. NCERT, New Delhi

- Venkateshamurthy, C. G., and Rao, A.V.G (2005). Life Skills Education Training Package. R.I.E.,Mysore.

SHARDA UNIVERSITY
Beyond Boundaries

SEP206:   Project

School: SOE		**Batch: 2020-24**	
Program: B.Sc. B.Ed.		**Current Academic Year: 2023-24**	
Branch: Education		**Semester: VIII**	
1	**Course Code**	**SEP206**	
2	**Course Title**	**Project**	
3	**Credits**	**2**	
4	**Contact Hours (L-T-P)**	**0-0-4**	
	Course Type	Project (compulsory)	
5	**Course Objectives**	The course has the following specific aims: 1-To provide first-hand experience. 2- To develop problem solving attitude	
6	**Course Outcomes**	On the completion of this course, the pupil-teachers will be able to- CO1: Develop insight about practical aspects of education. CO2: Apply theoretical knowledge into practice.	
7	**Course Description**	It is a practical work based on the educational issues and problems. It will develop understanding about the educational issues and challenges.	
8			
		Make a survey in a neighboring area about social, economic and educational status of that area.	
	Mode of examination	Viva	

Weightage Distribution	Project	Viva	
	70%	30%	

CCU 801: COMMUNITY CONNECT

School: SOE	Batch: 2020—2024
Program: B.Sc. B.Ed.	Current Academic Year: 2021-22
Branch: Education	Semester: VIII

1	Course Code	CCU 801
2	Course Title	Community Connect
3	Credits	2
4	Contact Hours (L-T-P)	1-0-0
	Course Type	Co-requisite
5	Course Objectives	The course has the following specific aims: 1. To make students aware about community life and activities 2. To provide real life experience of community life 3. To develop interest in community life and activities. 4. To develop positive attitude towards community. **5.** To make the students to aware of community problems and challenges
6	Course Outcomes	On the completion of this course, the pupil-teachers will be able to- CO1-Understand the various aspects of community life CO2- Feel the sensitivity of community's problems and challenges CO3-Develop problem solving attitude towards community CO4-Hypothesize different solutions and alternatives to community's problems. CO5-Understand the life as member of community member. CO6- the process of collecting data and its analysis for generalization of their experiences.
7	Course Description	This course provides an opportunity to associate with the rea life experience of community. This course will enable the pupil teachers to feel the problems at community level. This course enables a pupil teacher to have better understanding various types of thinking and attitudes of community members.

8	Course Outlines	
	Unit 1	
	A	Finalization of topics to be surveyed by students must be done with the consultation of allotted supervisors in between:
	B	Preparation of Questionnaire
	C	Finalization of Questionnaire
	Unit 2	
	A	Field Survey
	B	Data Collection
	C	Data analysis and report writing
	Unit 3	
	A	Presentation of Report
	B	Submission of final Report
	C	Viva-Voce
	Mode of examination	Viva
	Weightage Distribution	CA	MTE	ETE
		40%	0%	60%

SHARDA UNIVERSITY
Beyond Boundaries

SEB 205: PEACE EDUCATION

School: SOE	Batch: 2020—2024
Program: B.Sc. B.Ed.	Current Academic Year: 2023-24
Branch: Education	Semester: VIII

1	Course Code	SEB 205
2	Course Title	Peace Education
3	Credits	4
4	Contact Hours (L-T-P)	4-0-0
	Course Type	Elective
5	Course Objective	The course will enable the student-teachers to – 1. Demonstrate knowledge and understanding broader than that generally provided within a single department or discipline; 2. Demonstrate extended, deepened, and refined skills in critical thinking, research, and writing; 3. Demonstrate knowledge among different contexts to underscore the interdependence of thought; violence, social justice); 4. Demonstrate strong engagement as human beings and global citizens responsible for the world around them, present and future; demonstrate initial understanding of a vast topic that can be a locus for lifelong learning.
6	Course Outcomes	On the completion of this course, the pupil-teachers will be able to- CO1-Describe the conceptual basis of peace education, CO2-Understand the process of preparation for peace. CO3-Acquire knowledge about the important thinkers of peace. CO4-Develop awareness about issues and challenges of peace. CO5-develop empirical knowledge about peace through various experiences.
7	Course Description	**Peace education** is the process of acquiring the values, the knowledge and developing the attitudes, skills, and behaviors to live in **harmony** with oneself, with others, and with the natural environment. This paper will enable the pupil teacher to correct their attitude in favor of spreading the peace as a necessity for harmonious development of society and world.

8		
Unit 1		**Conceptual Introduction**
	A	Role of Education in Personal, Social, National, Global and Universal spheres; coherence and contradictions among these roles; Origin of Jealousy, Hostility, and Violence; Relations between humans and nature: the question of environment.
	B	Self and Identity: the enabling functions of 'self' in the context of motivation, development and adjustment; Freud's theory of the structure of the psyche. Individual and collective self; duality and conflict: interpersonal, communal, national.
	C	Understanding Conflict: The use of perspective, symbols, stereotypes, and rhetoric in analyzing communication and representation of contentious issues in television and other modern media; Analyzing life at school: culture of competition; corporal punishment and its consequences; role of family; gender roles and stereotypes.
	Unit 2	**Preparation for Peace**
	A	Introspection, Mediation, Persuasion: Cultivating the perspective and skills necessary for peace;
	B	Sources of stress and conflict: analysis and reflection of circumstances leading to stress and conflict.
	C	Dialogue: The concept and its applications in life in the family, school, and among peers.
	Unit 3	**Philosophical Resources** **Thinkers of Harmony:** Study of relevant extracts from the writings of
	A	Montessori ('Peace and Education')
	B	Iqbal ('Is Religion Possible')
	C	Dalai Lama ('Universal Responsibility'
	Unit 4	**Issues and Challenges**
	A	Justice and Peace: The Constitution as a means of conflict-resolution.
	B	Study of ongoing conflicts in the political, economic, socio-cultural and ecological spheres; Case studies of major conflicts between nation-states; Study of successful struggles for peace and ongoing processes of dialogue; Nationalism and its critics; war and markets; globalization: Economy, Politics, Technology; meanings and implications
	C	Childhood in conflict settings: case study of areas where conflicts of different kinds

		have led to displacement, violence or persistent social turmoil.
Unit 5	**Practicum**	
A	Excursion to sites or monuments symbolizing introspection;	
B	Organizing morning assembly, mediation, exhibition, etc. on peace - related themes.	
C	End of term project: Each student will be required to submit and present in class a paper covering a short analysis of any contemporary conflict and a proposal to resolve it.	
Mode of examination	Theory/Jury/Practical/Viva	

Weightage Distribution	CA	MTE	ETE
	40%	0%	60%

References	1. Golding, D. (2017). "Border Cosmopolitanism in Critical Peace Education,", Journal of Peace Education 14(2): 155-75
	2. Bajaj, M. (2008). Encyclopedia of Peace Education. Charlotte: Information Age Publishing
	3. Bajaj, M. (2015). 'Pedagogies of Resistance' and critical peace education praxis. Journal of Peace Education 12(2): 154-166.
	4. Bajaj, M. & Hantzopooulos, M. (Eds) (2016). Introduction: Theory, Research, and Praxis of Peace Education in Peace Education: International Perspectives. New York: Bloomsbury (1-16).
	5. Trifonas, P. P. & Wright, B. (2013). "Introduction," in Critical Peace Education: Difficult Dialogues. New York: Springer, (xiii-xx).
	6. Standish, K. & Joyce, J (2017). (Forthcoming) Yogic Peace Education: Theory and Practice. Jefferson: McFarland and Company.
	7. Salomon, G. (2002). "The Nature of Peace Education: Not All Programs Are Created Equal" in G. Salomon and B. Nevo (eds.) Peace education: The concept, principles and practices in the world. Mahwah, NJ: Lawrence Erlbaum. Quoted in Nelson, Linden L. (2000). "Peace Education from a Psychological Perspective: Contributions of the Peace and Education Working Group of the American Psychological Association Div. 48."
	8. Clarke-Habibi, Sara. (2005) "Transforming Worldviews: The Case of Education for Peace in Bosnia and Herzegovina". Journal of Transformative Education, Vol. 3 No. 1, pp. 33-56.

![SHARDA UNIVERSITY Beyond Boundaries]

SEB 206: LIFE SKILLS EDUCATION

	School: S0E	Batch: 2020-24
	Program: B.Sc. B.Ed.	Current Academic Year: 2023-24
	Branch: Education	Semester: VIII
1	Course Code	SEB 206
2	Course Title	Life Skills Education
3	Credits	4
4	Contact Hours (L-T-P)	4-0-0
	Course Type	Elective
5	Course Objectives	The course will enable the student-teachers to – 1-Promote reflective thinking about concept of life Skills Development and its relevance to understanding community. 2- Develop Understanding of the concept of Life Skills and Interpersonal Skills for building a healthy environment for youth and children. 3-Enhance their capacity to critically assess the importance of self-esteem and assertiveness identifying behavioral health issues. 4-Systematically reflect upon about child vulnerability, Child Rights and Protection of rights. 5- To develop empirical thinking about the life skills
6	Course Outcomes	On the completion of this course, the pupil-teachers will be able to: CO1: Understand the concept of life Skills Development and its relevance to understanding community. CO2: Understand the concept of Life Skills and Interpersonal Skills for building a healthy environment for youth and children. CO3: Assess the importance of self-esteem and assertiveness identifying behavioural health issues. CO4: Identify need of knowledge about child vulnerability, Child Rights and

		Protection of rights.
		CO5: Apply the practical experiences in the teaching learning environment.
7	**Course Description**	In this Course, we examine the concept of Life skills and its application. We focus on the childhood and youth development issues. The Course takes into account the intervention and rehabilitation perspective of life skills.
8	Outline syllabus	
	Unit 1	**Concept and need**
	A	Life Skills: Concept, need and importance of Life Skills for human beings. Difference between Livelihood Skills and Life Skill, Core Life Skills prescribed by World Health Organization
	B	Life Skills Education: Concept, need and importance of Life Skills Education for teachers.
	C	Key Issues and Concerns of Adolescent students in emerging Indian context.
	Unit 2	Process and Methods Enhancing the Life Skills
	A	Classroom Discussions, Brainstorming and Role plays Small Groups discussions followed by a presentation of group reports, Decision making and mapping of using problem trees.
	B	Audio and Visual activities, e.g., Arts, Music, Theatre, Dance, Educational Games and Simulation
	C	Case Studies, Storytelling, Debates
	Unit 3	**Core Life Skills (I)**
	A	Skills of Self-awareness and Empathy: Concept, Importance for Teachers in particular, Integration with the teaching learning process,
	B	Learning to live together with other living beings. Acceptance of diversity in perspectives of different societies and cultures.
	C	Skills of Coping with Stress and Emotion: Concept, importance for Teachers in particular and Integration with the teaching learning process, Skills of Building Interpersonal relationships: Concept, Importance for Teachers in particular and Integration with the teaching- learning process.
	Unit 4	**Core Life Skills (II)**
	A	Skills of Critical thinking and Creative thinking: Concept, importance for Educationists, Integration with the teaching learning process.
	B	Skills of Problem Solving and Decision making: Concept, importance for Educationists, Integration within the teaching -learning process.
	C	Skill of Effective Communication: Concept, importance for Human beings and Educationists, Integration within the teaching learning process.
	Unit 5	Practicum
	A	The activities listed in Unit II with respect to the process and methods of Life Skills

		will be taken up in workshops to initiate the student-teachers with respect to the dynamics of the same. Human animal interface: Case of study of a domestic/institutional animal/with human being.
	B	The Core Life Skills will also be demonstrated through role plays on diverse issues in the form of workshops.
	C	The student-teachers shall also engage in reflection on different core Life Skills being displayed by children in schools during their field engagement.
	Mode of examination	Theory

Weightage Distribution	Weightage Distribution	CA	MTE	ETE
		30%	20%	50%

Text book/s* Other References	• Life Skills Education Paperback – 2016, by Dr. K. RavikanthRao, Dr. P. Dinakar. • Life Skill Education by Dr.Rajeshkumar I. Bhatt

SEB 207: GUIDANCE AND COUNSELING

School: SOE	Batch: 2020—2024
Program: B.Sc. B.Ed.	Current Academic Year: 2023-24
Branch: Education	Semester: VIII

1	Course Code	SEB 207
2	Course Title	Guidance and Counseling
3	Credits	4
4	Contact Hours (L-T-P)	4-0-0
	Course Type	Elective
5	Course Objectives	The course has the following specific aims: 1-To sensitize the student-teachers with the need and relevance of Guidance and Counseling. 2-To develop an understanding of the process of Guidance and Counseling 3-To analyses the role of the teacher in the provision of Guidance and Counseling 4- To Provide reflective session to the pupil teachers for hand on experience of the pupil teachers.
6	Course Outcomes	On the completion of this course, the pupil-teachers will be able to- CO-1. Understand the Concept and Need of Guidance and Counselling. CO2: Explain the process of **Counseling.** CO3: Make differentiation among various Types of counselling. CO4: Describe various emotional measures, skills and strategies for Coping with Stress CO5: Identify the Issues and Concerns in Schools related with counselling and guidance. CO6: Develop reflective thoughts through first hand experiences.
7	Course Description	This course covers the basic concept, need, types of Guidance and counselling and *Issues Concerns in Schools.*
8		
	Unit 1	**Concept and Need of Guidance and Counselling**

A	Introduction to Guidance and Counselling- Meaning, Need, Aims & Objectives,
B	Principles, Difference between Guidance &Counselling Guidance for Human Development and Adjustment
C	Role of the teacher in Guidance and Counselling
Unit 2	Counselling: Concept and Types
A	Counselling Service- Meaning, Purpose & Approaches (Directive, Non- Directive and Eclectic counselling).
B	Counselling: Process and Strategies
C	Counselling Services for Students: Options in Face to Face and Online Mode
Unit 3	Coping with Stress: Emotions and Skills
A	Coping Skills: Overview of details of different types of coping skills and integration of the same when need be
B	Emotions: Managing emotions interpersonal skills, feeling good, emotions intelligence
C	Skills and Values ñ Listening Attentively to the concerns of the counselee, Negotiating Self Discovery, Decision Making, Problem Solving etc and values such as Patience, Empathy etc.
Unit 4	*Issues and Concerns in Schools*
A	Career Information in Guidance and Counselling: Broad outline with respect to the Career Guidance and Counselling options available in India
B	Special Concerns in Counselling: Ethics and other related psychological concerns.
C	Issues of mental wellbeing in schools
Unit 5	**Practicum**
A	Self- Study and reflective sessions should also be an important feature of the practical which shall include: Field visits and tours may also arrange to provide student-teachers with the first- hand experience of the working of guidance institutions and professionals in schools such as Counsellors, Career Counsellors etc •
B	Student teachers to prepare a list of the online Guidance and Counselling Services available of students and Teachers in India.
C	Detailed study of the Guidance and Counselling Services available in a given School
Mode of examination	Theory
Weightage	CA MTE ETE

Distribution	30%	20%	50%

Text book/s*	- Aggarwal, J. C., (2000). Educational & Vocational Guidance and Counselling, Jalandhar:Doaba House. · - Asch, M. (2000). Principles of Guidance and Counselling, New Delhi: Sarup and Sons. · - Bhatia, K. K., (2002). Principles of Guidance and Counselling, Ludhiana: Vinod Publications. · Bhatnagar, R. P.; Rani. S. (2001); Guidance and Counselling in Education and Psychology. · Gibson, R.L. and Mitchell (2008). Introduction to counseling and Guidance. New Delhi: PHI Learning Pvt. Ltd. · - Joneja G. K. (1997); Occupational information in Guidance, NCERT publication · Kochhar S.K. (1999) Guidance and counseling in colleges and universities - Nayak A.K. (2004); Guidance and Counseling · Oberoi S.C (2000); Educational, Vocational Guidance and Counseling · - Rao S. N. (1991) Counseling and Guidance. · - Safaya, B.N., (2002). Guidance &Counseling, Chandigarh: Abhishek Publications. · - Sharma R A Fundamentals of Guidance and Counseling Bachelor of Education 38 Guru Gobind Singh Indraprastha University Sector-16 C, Dwarka, New Delhi · - Sharma, R. N. (2004); Guidance and Counseling · Sharma, Tara Chand, (2002). Modern Methods of Guidance and Counseling, New Delhi - Sarup and Sons. · Shertzer, Bruce and Stone, Shelly C., (1974). Fundamentals of Counseling, London: Houghton Missli. · - Shirley, A. Harmin and Guilford, E., (1987). Guidance in the Secondary Schools, New Delhi: NCERT. · Sidhu, H. S., Guidance and Counseling, (2005), Twenty First Century, Patiala. · Sodhi, T.S. &Suri, S. P., (1999). Guidance and Counselling, Patiala: Bawa Publication.