DAV UNIVERSITY, JALANDHAR

FACULTY OF EDUCATION

SYLLABI

FOR

Session 2020-21

B.Sc.B.Ed.

A FOUR YEAR INTEGRATED PROGRAMME

Sem	Core Courses (6 Credit each)	Ability enhancement compulsory course (2 credits each)	Skill Enhancement course/Enhancing Professional Capacities (SEC/EPC) (4 credits each)	Discipline Specific Electives (DSE) (6 credits each)	Perspectives in Education (PE) (6 credits each)	Curriculum & Pedagogic studies (CPS) (4 credits each)	Field Engagement/ Internship/ developing critical skills
I	1. Botany/Physics 2. Zoology/Mathematics 3. Chemistry	1.English/MIL (Communicative) (3 credits) 2. Environmental Studies (2 credits)			1.Perspectives in Education		Teacher Assistance (1 credit)
II	1. Botany/Physics 2. Zoology/Mathematics 3. Chemistry	1.English/MIL (Communicative) (3 credits) 2. Environmental Science (2 credits)			2.Early childhood, Childhood and Growing up		Interacting child 's parents (1 credit)
III	1. Botany/Physics 2. Zoology/Mathematics 3. Chemistry		1. (i) Value and Ethics in Education (2 credits) (ii)Guidance &Counselling (2 credits)		3. Contemporary India and Education		Recording best practices in the different schools 1. Model schools 2. Urban Schools 3. Rural Schools Both Private & Govt. (1 credit)
IV	1. Botany/Physics 2. Zoology/Mathematics 3. Chemistry		2. (i) Drama & Art in Education (ii)Reading and reflecting on text (2 credits)		4. Learning and Teaching	1.(i) Language across the curriculum (2 credits) (ii) Assessment for learning (2 credits)	Preparing School Map (1 credit)
V			3. Understanding ICT and its use in teaching & learning	1. Botany/Physics 2. Zoology/ Mathematics 3. Chemistry	*5.Health, Yoga and Physical education*	*2.(i) Pedagogy of Biological Science- I/ Pedagogy of Physical* Pedagogy of Mathematics- I Pedagogy of Languages –I (English/Hindi/Punjabi)	Observing PTM and Participating in PTM
VI			4. Understanding self And personality	Botany/Physics 1. Zoology/		3.(i) Pedagogy of Biological Science- II/	Pre- internship (4 credits)
			Development (4 Credits)	Mathematics 3. Chemistry		Pedagogy of Physical Science- II/ Pedagogy of Mathematics- II Pedagogy of Languages –II (English/Hindi/Punjabi)	
VII							Internship (14 credits) and Working with community (2 credits)
VIII					6. Knowledge and school management. 7. Curriculum Development 8. Creating an inclusive school		Post internship engagement with the filed task and assignment for, EPC2, EPC4, PE6 & PE7 Submission of Mentorship report. (1 credit)

Semester I

COURSE	COMPONENT	NATURE	COURSE CODE	COURSE NAME	DISTRIBUTION OF HOURS			TOTAL CREDITS
					LECTURE	TUTORIAL	PRACTICAL	
1.	Perspectives in Education	Compulsory	EDU101	Perspectives in Education	**6**	**0**	**0**	**6**
2.	Core Course	Compulsory	EDU109	Chemistry	**4**	**0**	**0**	**4**
3.	Core Course	Compulsory	EDU110	Chemistry- Practical	**0**	**0**	**3**	**2**
4.	Core Course	Compulsory	EDU121/ EDU125	Botany/ Physics	**4**	**0**	**0**	**4**
5.	Core Course	Compulsory	EDU122/ EDU126	Botany- Practical/ Physics- Practical	**0**	**0**	**3/4**	**2**
6.	Core Course	Compulsory	EDU123/ EDU115	Zoology/ Mathematics	**4/6**	**0**	**0**	**4/6**
7.	Core Course	Compulsory	EDU124	Zoology- Practical	**0**	**0**	**3**	**2**
8.	Field Engagement/ Internship/ Developing Critical Skills	Compulsory	EDU131B	Teacher Assistance	**0**	**0**	**1 Week**	**1**
9.	Ability Enhancement Compulsory Course	Compulsory (One of three)	EDU151B/ EDU151C/ EDU151D	Basic Communication Skills- English/ Punjabi/ Hindi	**3**	**0**	**0**	**3**
10.	Ability Enhancement Compulsory Course	Compulsory	EDU152	Environmental Studies	**2**	**0**	**0**	**2**
GRAND TOTAL								**30**

PERSPECTIVES IN EDUCATION

COURSE NAME: PERSPECTIVES IN EDUCATION

COURSE CODE: EDU101

L	T	P	CR
6	0	0	6

OBJECTIVES: To enable to student teachers to:

- Understand the relationship between philosophy and education.
- Understand the relationship between sociology and education.
- Understand the relationship between psychology and education.
- Gain knowledge about the contributions of Indian and Western thinkers in education.
- Comprehend the concept of values and its philosophical basis as viewed by various philosophers.
- Analyze society, the process of socialization and social change in India.
- Analyze different theories of intelligence.

COURSE CONTENT UNIT- I

- Philosophy: major schools of philosophy and their educational implications: Idealism, Naturalism, Pragmatism and Realism.
- **Contribution of Eastern and Western Thinkers**
  - Eastern Thinkers: Dr. Radhakrishnan, Aurobindo, Maharishi Swami Dayanand, Gandhi, Vivekananda and Tagore
  - Western Thinkers: Plato, Rousseau, Dewey and Froebel.

UNIT- II

- Meaning and functions of Sociology and Sociology of Education.
- Society: Structure, Social stratification, Social mobility, Socialization.
- Social change in India: Factors affecting social change: Caste, Ethnicity, Class, Language, Religion and Regional imbalances, Education for Social change.
- Concept of Culture: Education for Cultural change, Modernization.

UNIT- III

- Educational Psychology: Concept, Nature, Scope and Objectives.
- Relationship of Psychology and Education.
- Intelligence: Concept, Nature, Theories of Intelligence, Concept of Intelligence Quotient, Emotional Quotient and Social Quotient, Measurement of Intelligence.
- Memory/ Forgetting: Concept, Nature, Types, Theories, features effecting memory/ forgetting, Mnemonics.

UNIT- IV

- Aptitude, Attitude, Interest and their Measurement.
- Problem solving, Concept formation, thinking: Concept, Nature, Types and Process.
- Differently abled children:
  - Dyslexia, Dyscalculia, Dysgraphia, Dyspraxia, Aphasia: Meaning, Nature, Etiology and Treatment.
  - Auditory Processing Disorder, Visual Processing Disorder, ADHD and Autism: Meaning, Nature, Etiology and Treatment.

INDIVIDUALIZED SESSIONAL WORK: It will include the following activities:

1. Participation in any two co- curricular activities organized in the Institution.
2. Critical analysis of education philosophy of any one thinker in the syllabus.
3. A Project work/ survey related to community and social work.
4. Psychological tests as per the requirement of the syllabus.

TRANSACTIONAL MODALITIES

Communicative/Interactive and Constructivist approaches, imparting knowledge by means of creating situations. Teaching and learning of the course will be through a student-centred approach. Different interactive strategies, such as group discussions, presentations, and assignments will be applied to promote creativity. Independent learning will also be encouraged through class assignments. The course readings will be provided to students at the start of the course to inculcate the habit of reading. This will also help to raise the level of in-class discussion and make the course more dynamic.

SUGGESTED READINGS

1. Bhatia, K. K. & Narang, C. L. (2003). Principles of Education (Methods and Techniques). Ludhiana: Tandon Publishers.
2. Brubacher, John, S. (1962). Modern Philosophies of Education. New York: McGraw Hill Book Company, Inc.
3. Chaube, S. P. & Chaube, A. (2000). Philosophical and Sociological Foundations of Education. Agra: Vinod Pustak

mandir.
4. Connor, D. J. O. (1957). An introduction to Philosophy of Education. London: Routledge.
5. Dhavan, M. L. (2005). Philosophy of Education. Delhi: Isha Books.
6. Durkheim, Emile (1956). Education and Sociology. New York: Free Press.
7. Illich, I. (1971). Deschooling Society. New York: The Macmillan Company.
8. Dewey, J. (1961). Democracy and Education. New York: The Macmillan Company.
9. Passi, B. K. (2004). Value Education. Agra: National Psychological Cooperation.
10. Taneja, V. R. (1973). Foundations of Education: Philosophical and Sociological. New Delhi: Sterling Publications.
11. Walia, J. S. (2001). Principles and Methods of Education. Jalandhar: Paul Publishers.
12. Walia, J. S. (2004). Principles of Education. Jalandhar: Paul Publishers.
13. Aggarwal, J. C. (1999). Elementary Educational Psychology. New Delhi: Vikas Publishing House.
14. Bigge, M. L., & Hunt, M. P. (1968). Psychological Foundations of Education (2nd Ed.). New York: Harper & Row Publishers.
15. Chauhan, S. S. (2004). Advanced Educational Psychology. New Delhi: Vikas Publishing House.
16. Cohen, A., & Cohen, C. (1986). Special Educational needs in the ordinary schools. New York: Harper & Row Publishers.
17. Cohen, A., & Cohen, C. (1986). Exceptional Children. New York: Harper & Row Publishers.
18. Danion, W. (1983). Social and Personality Development: Infancy through Adolescence. New York: Norton.
19. Gupta, V. K. (2003). Psychology of learning and development. New Delhi: Vinod Publications.
20. Hilgard, E. R. (1958). Introduction to Psychology. New York: Harcourt.
21. Kulshreshtha, S. P. (1997). Educational Psychology. Meerut: R Lall Book Depot.
22. Mangal, S. K. (1992). Educational Psychology. Ludhiana: Parkash Brother Publications.
23. Mathur, S. S. (1986). Educational Psychology. Agra: Vinod Pustak Mandir.
24. Miffin, B. R. (1978). Psychology Applied to Teaching. Haughton: Bosson.
25. Sharma, R. A. (2002). Fundamentals of Educational Psychology. Meerut: R Lall Book Depot.
26. Suri, S. P., & Sodhi, T. S. (2006). Psychological Foundations of Education. Patiala: Bawa Publications.
27. Thomas, G., & Brudhy, J. E. (1977). Educational Psychology. Jalandhar: Paul Publishers.
28. Walia, J. S. (2008). Foundations of Educational Psychology. Jalandhar: Paul Publishers.
29. Westhood, P. (1987). Common sense methods for children with special needs. London: Crown Helm Publishers.
30. Woolfolk, A. (2003). Educational Psychology. New Delhi: Dorling Kinderslay Pvt. Ltd.
31. Hurlock (2001). Child Development. Tata McGraw- Hill Education.
32. Morgan (2001). Introduction to Psychology. Tata McGraw- Hill Education.

CORE COURSE CHEMISTRY (COMPULSORY)

COURSE NAME: INORGANIC CHEMISTRY-I
COURSE CODE: EDU109

L	T	P	CR
4	0	0	4

OBJECTIVES:
This course is intended to learn the basic concepts of Inorganic Chemistry. The various topics of the syllabus are grouped under different units in order to bring forth importance of academic and laboratory skills for the undergraduate students.

EXPECTED PROSPECTIVE
This course will equip students with the necessary chemical knowledge concerning the fundamentals in the basic areas of Inorganic chemistry. The students will be able to pursue their career objectives in advance education, scientific research and teaching. **COURSE CONTENT**

UNIT-I
Atomic Structure:

- Bohr's theory, its limitations and atomic spectrum of hydrogen atom. Wave mechanics: de Broglie equation, Heisenberg 's Uncertainty Principle and its significance. Quantum numbers and their significance. Shapes of *s*, *p*, *d* and *f* orbitals. Pauli 's Exclusion Principle, Hund 's rule of maximum multiplicity, Aufbau 's principle and its limitations.
- **periodicity of Elements:** *s*, *p*, *d*, *f* block elements, the long form of periodic table. Detailed discussion of the following properties of the elements,
with reference to *s*&*p*-block.

a. Effective nuclear charge, shielding or screening effect, Slater rules, variation of effective nuclear charge in periodic table.
b. Atomic radii (van der Waals)

c. Ionic and crystal radii.
d. Covalent radii (octahedral and tetrahedral)
e. Ionization enthalpy, Successive ionization enthalpies and factors affecting ionization energy. Applications of ionization enthalpy.

UNIT-II

- **Chemical Bonding**
  - *Ionic bond:* General characteristics, types of ions, size effects, radius ratio rule and its limitations. Packing of ions in crystals.
  - *Covalent bond:* Lewis structure, Valence Bond theory (Heitler-London approach). Resonance and resonance energy, Molecular orbital theory.

Molecular orbital diagrams of diatomic and simple polyatomic molecules N_2, O_2. Valence shell electron pair repulsion theory (VSEPR) shapes of simple molecules and ions containing lone pairs and bond pair of electrons, multiple bonding (σ and π bond approach) and bond lengths.

- *Metallic Bond:* Qualitative idea of valence bond and band theories. Semiconductors and insulators, defects in solids.

UNIT-III

- **Chemistry of *s* and *p* Block Elements:** Inert pair effect, Relative stability of different oxidation states, diagonal relationship and anomalous behaviour of first member of each group. Allotropy and catenation. Complex formation tendency of *s* and p block elements.
- **Noble Gases:** Occurrence and uses, rationalization of inertness of noble gases, preparation and properties of XeF_2, XeF_4 and XeF_6; Nature of bonding in noble gas compounds (Valence bond treatment). Molecular shapes of noble gas compounds (VSEPR theory)

UNIT IV

- **General Principles of Metallurgy:** Chief modes of occurrence of metals based on standard electrode potentials. Methods of purification of metals: Electrolytic Kroll process, and Mond 's process, Zone refiringe Van- Arkel method.

SUGGESTED READING

1. Lee, J.D. *Concise Inorganic Chemistry*, ELBS, 1991.
2. Douglas, B.E. and Mc Daniel, D.H. *Concepts & Models of Inorganic Chemistry*, Oxford, 1970.
3. Day, M.C. and Selbin, J. *Theoretical Inorganic Chemistry*, ACS Publications 1962.
4. Vogel, A.I. *A Textbook of Quantitative Inorganic Analysis*, ELBS

CORE COURSE CHEMISTRY (COMPULSORY)

COURSE NAME: INORGANIC CHEMISTRY-I PRACTICAL
COURSE CODE: EDU110

L	T	P	CR
0	0	3	2

INDIVIDUALIZED SESSIONAL WORK: It will include the following activities:

1. Titrimetric Analysis

i. Calibration and use of apparatus
ii. Preparation of solutions of different Molarity/Normality of titrants.

2. Acid-Base Titrations

i. Estimation of carbonate and hydroxide present together in mixture.
ii. Estimation of carbonate and bicarbonate present together in a mixture.
iii. Estimation of free alkali present in different soaps/detergents.

3. Oxidation-Reduction Titrimetry

i. Estimation of Fe (II) and oxalic acid using standardized KMnO4 solution.
ii. Estimation of oxalic acid and sodium oxalate in a given mixture.
iii. Estimation of Fe (II) with K2Cr2O7 using internal (diphenylamine, anthranilic acid) and external indicator

CORE COURSE (MATHEMATICS)

COURSE NAME: ALGEBRA COURSE CODE: EDU115

L	T	P	CR
6	0	0	6

OBJECTIVES: To enable the student teachers to:

- Describe the concept of mappings, equivalence relations and partition.
- Perform elementary operations on matrices; inverse of matrix.
- Explain independence of row and column vectors, row rank, column rank and rank of matrix.
- Apply matrices to a system of homogenous and non-homogeneous equations.
- Describe Cayley Hamilton theorem and its use in finding inverse of a matrix.
- Describe and compute relations between the roots and co-efficient of general polynomial equation in one variable and transform equations.
- Discuss and apply Descart 's rule of signs.
- Use cardon method to derive solutions of cubic equations and biquadratic equations.
- Understand and apply Gregouy 's series, summation of series.

COURSE CONTENT UNIT-I

- Matrix- Definition and Types. Symmetric, Skew-symmetric, Hermitian and skew-Hermitian matrices. Inverse of a matrix. Elementary operations on matrices. Rank of a matrix. Linear dependence and independence of rows and columns of matrices. Row rank and Column rank of a matrix. Eigenvalues, eigenvectors and the characteristic equation of a matrix. Minimal polynomial of a matrix. Cayley Hamilton theorem and its use in finding the inverse of a matrix.

UNIT-II

- Applications of matrices to a system of linear (both homogeneous and non–homogeneous) equations. Theorems on consistency of a system of linear equations. Unitary and Orthogonal Matrices, Bilinear and Quadratic forms.

UNIT-III

- Relations between the roots and coefficients of general polynomial equation in one variable. Solutions of polynomial equations having conditions on roots. Common roots and multiple roots. Transformation of equations.

UNIT-IV

- Nature of the roots of an equation. Descartes 'rule of signs. Solutions of cubic equations (Cardano 's method). Biquadratic equations and their solutions.

INDIVIDUALIZED SESSIONAL WORK: It will include the following activities:

1. Teacher may familiarize the students with examples of Course content

2. Teacher will give extensive practice in the mathematical skills.

SUGGESTED READINGS

1. Hall H.S. and Knight, S.R. Higher Algebra. Agra: H.M. Publications, 1994.
2. Narayan, Shanti, and Mittal, P.K. A Text Book of Matrices. New Delhi: S. Chand & Co. Ltd., Reprint 2002.
3. Grewal, B.S. Higher Engineering Mathematics. New Delhi: Khanna Publishers, 2012.
4. Jain, R. K., and Iyengar S. R. Advanced Engineering Mathematics, New Delhi: Narosa Publishing House, 2003.

L	T	P	CR
4	0	0	4

COURSE NAME: PLANT DIVERSITY
COURSE CODE: EDU121
CORE COURSE (BOTANY)
COURSE CONTENT UNIT- I

- **Viruses:** General account on Viruses
- **Bacteria:** Salient features, types and cell structure.
- **Algae:** General Characters; systematic position, structure and life history of Oscillator (Cyanophyceae) Volvox, Oedogonium (Chlorophyceae); Vaucheria (Xanthophyceae); Sargassum (Phaeophyceae); Batrachospermum (Rhodophyceae) and economic importance of algae.

UNIT-II

- **Fungi**: General characters; systematic position, structure and life history of Albugo (White rust of crucifers: *Albugo candida*), *Rhizopus*, *Saccharomyces*, *Agaricus*, Puccinia (Black rust of wheat: *Pucciniagraministritici*), Colletotrichum (Red rot of sugarcane: *Colletotrichumfalcatum*); general account of Lichens and their economic importance.

UNIT- III

- **Bryophyta**: General characters; systematic position, structure, reproduction and life cycle of *Marchantia* and *Riccia*

(Hepaticopsida); *Anthoceros* (Anthocerotopsida) and Funaria (Bryopsida) excluding developmental stages.

UNIT- IV

- **Pteridophyta**: General characters; systematic position, structure, reproduction and life cycle of *Rhynia* (Psilophytopsida);

Selaginella (Lycopsida); *Equisetum* (Sphenopsida) and *Pteris* (Pteropsida) excluding developmental stages.

SUGGESTED READINGS

1. Alexopoulos, C. J. Mims, C. W`and Blackwell, M. 1996. Introductory Mycology. John Wiley and Sons, Inc. USA.
2. Dube, H.C. 1990. An Introduction to Fungi. Vikas Publishing House Pvt. Ltd., Delhi.
3. Sharma, P.D. 1991. The Fungi. Rastogi& Co., Meerut.
4. Smith, G.M. 1971. Cryptogamic Botany. Vol. 1, Algae & Fungi, Tata McGraw Hill Publishing Co. New Delhi.
5. Singh, V. Pandey, P.C. and Jain, D.K. 2012. Text Book of Botany, Diversity of Microbes and Cryptogams. Rastogi Publications, Meerut & New Delhi.
6. Vishishta, B. R. 1999. Botany for Degree Students. Algae. S. Chand and Company Ltd., New Delhi.
7. Vishishta, B. R. 1999. Botany for Degree Students. Fungi. S. Chand and Company Ltd., New Delhi.
8. Puri, P. 1980. Bryophyta. Atma Ram & Sons, Delhi.
9. Vishishta, B. R. 1999. Botany for Degree Students. Bryophyta. S. Chand and Company Ltd., New Delhi.
10. Vishishta, B. R. 1999. Botany for Degree Students. Pteridophyta. S. Chand and Company Ltd., New Delhi.

CORE COURSE
(BOTANY)

L	T	P	CR
0	0	3	2

COURSE NAME: PLANT DIVERSITY PRACTICAL
COURSE CODE: EDU122
INDIVIDUALIZED SESSIONAL WORK: It will include the following activities:

1. Study of morphology of various genera included in algae and fungi.
2. Study of Crustose, Foliose and Fructicose types of Lichen thalli.
3. Histopathological study of White rust of crucifers, loose smut of wheat, Black rust of wheat and Red rot of sugarcane.
4. Study of morphology of various genera mentioned in Bryophyta and Pteridophyta.
5. Preparation of permanent stained slides of: *Marchantia* (V.S. Thallus) *Selaginella* (T.S. Stem) *Riccia* (V.S. Thallus) *Anthoceros* (V.S. Thallus) *Equisetum* (T.S. Aerial stem passing through internode) *Funaria* (T.S. Stem) *Pteris* (T.S. Petiole and leaflet)
6. Study of permanent slides of the above specimens.

CORE COURSE (PHYSICS)

COURSE NAME: MECHANICS
COURSE CODE: EDU125

L	T	P	CR
4	0	0	4

COURSE CONTENT

UNIT I: FUNDAMENTALS OF DYNAMICS

- Fundamentals of Dynamics: Reference frames. Inertial frames; Galilean transformations; Galilean in variance centre of mass. Principle of conservation of momentum.
- Conservative and non-conservative forces. Potential Energy. Force as gradient of potential energy.
- Collisions: Elastic and inelastic collisions between particles. Centre of mass and laboratory frames. Various relations between lab and centre of mass frames.

UNIT II: ROTATIONAL DYNAMICS AND ELASTICITY

- Rotational Dynamics: Angular momentum of a particle and system of particles. Torque. Principle of conservation of angular momentum. Rotation about a fixed axis. Moment of Inertia. Calculation of moment of inertia for rectangular, cylindrical and spherical bodies. Kinetic energy of rotation. Motion involving both translation and rotation. Elasticity: Relation between Elastic constants.

UNIT III: CENTRAL FORCES AND NON-INERTIAL SYSTEMS

- Central forces and Central Force Motion: Motion of a particle under a central force field. Two-body problem and its reduction to one-body problem. Differential equation of orbit. Kepler ‘s laws. Satellite in circular orbit and applications. Basic idea of global positioning system.
- Non-Inertial Systems: Non-inertial frames and fictitious forces. Uniformly rotating frame. Laws of physics in rotating coordinate systems. Centrifugal force. Coriolis force and its applications. Components of velocity and acceleration in cylindrical and spherical Coordinate systems.

UNIT IV: SPECIAL THEORY OF RELATIVITY

- Special Theory of Relativity: Michelson-Morley experiment and its outcome. Postulates of special theory of relativity. Lorentz transformations. Simultaneity and order of events. Lorentz contraction. Time dilation and its experimental verification. Relativistic transformation of velocity, Relativistic addition of velocities. Variation of mass with velocity. Mass less Particles. Mass-energy equivalence. Relativistic Doppler Effect. Relativistic kinematics. Transformation of energy and momentum.

SUGGESTED READINGS

1. D. Kleppner, R.J. Kolenkow, An introduction to mechanics, New Delhi: McGraw-Hill, 1973.
2. C.Kittel, W. Knight, et.al. Mechanics, Berkeley Physics, vol.1, New Delhi: Tata McGraw-Hill, 2007.
3. Resnick, Halliday and Walker, Physics, 8/e. Wiley, 2008.
4. G.R. Fowles and G.L. Cassiday, Analytical Mechanics, New Delhi: Cengage Learning, 2005.
5. R. P. Feynman, R. B. Leighton, M. Sands, Feynman Lectures, Vol. I, Pearson Education, 2008.
6. R. Resnick, Introduction to Special Relativity, John Wiley and Sons, 2005.
7. R. L. Reese University Physics, Thomson Brooks/Cole, 2003.
8. D.S. Mathur, Mechanics, New Delhi: S. Chand and Company Limited, 2000.
9. F.W Sears, M.W Zemansky, H.D Young, University Physics. 13/e, Addison Wesley, 1986.

CORE COURSE
(PHYSICS)

COURSE NAME: MECHANICS PRACTICAL COURSE CODE: EDU126

L	T	P	CR
0	0	4	2

INDIVIDUALIZED SESSIONAL WORK: It will include the following activities:

1. Measurements of length (or diameter) using vernier calliper, screw gauge and travelling microscope.
2. To study the random error in observations.
3. To determine the height of a building using a Sextant.
4. To study the Motion of Spring and calculate (a) Spring constant, (b) **g** and (c) Modulus of rigidity
5. To determine the Moment of Inertia of a Flywheel.
6. To determine **g** and velocity for a freely falling body using Digital Timing Technique
7. To determine Coefficient of Viscosity of water by Capillary Flow Method (Poiseuille‘s method).
8. To determine the Young's Modulus of a Wire by Optical Lever Method.
9. To determine the Modulus of Rigidity of a Wire by Maxwell ‘s needle
10. To determine the elastic Constants of a wire by Searle ‘s method.
11. To determine the value of g using Bar Pendulum.
12. To determine the value of g using Kater ‘s Pendulum.

CORE COURSE (ZOOLOGY)

COURSE NAME: ANIMAL DIVERSITY I: NON-CHORDATES
COURSE CODE: EDU123

L	T	P	CR
4	0	0	4

COURSE CONTENT

UNIT-I

- **Protozoa:** General characteristics of protozoans and their classification up to orders; Detailed study of *Euglena*, *Plasmodium*, *Evolution* of symmetry and segmentation of Metazoa
- **Porifera:** Canal system and spicules in sponges.
- **Cnidaria:** General characteristics and classification up to orders; Metagenesis in *Obelia*; corals and coral reefs; polymorphism in Cnidaria, Evolutionary significance of Ctenophora.

UNIT-II

- **Platyhelminthes:** General characteristics and classification up to orders. Life cycle and pathogenicity of *Fasciola hepatica* and *Taeniasolium*
- **Nemathelminthes:** General characteristics and classification upto orders; Lifecycle, and pathogeniciy of *Ascarislumbricoides*

UNIT-III

- **Annelida:** General characteristics and classification up to orders. Excretion in Annelida
- **Arthropoda:** General characteristics and classification up to orders; vision and respiration in Arthropoda; Metamorphosis in Insects; social life in bees and termites.

UNIT-IV

- **Mollusca:** General characteristics and classification up to orders; Torsion anddetorsion in Gast opoda; Pearl formation in bivalves; Evolutionary significance of trocophore larva.
- **Echinodermata:** water vascular system in Asteroidea; Larval forms in Echinodermata; Affinities with Chordates.

SUGGESTED READINGS

1. Dhami, P.S. and Dhami, J.K. *Invertebrate Zoology.* 5th edition New Delhi: R. Chand & Co.,
2. Hyman L.H. *The Invertebrates.* Vol. I, II, III, IV and V. McGraw Hill Book Company. Inc.,, 1959.
3. Kotpal, R.L. *Minor phyla*. 5th ed. Meerut: Rastogi Publishers, 2006.
4. Kotpal, R.L. *Modern Text Book of Zoology Invertebrates*. 10th ed.,astogi Publishers, Meerut, 2012.

CORE COURSE (ZOOLOGY)

L	T	P	CR
0	0	3	2

COURSE NAME: ANIMAL DIVERSITY I: NON-CHORDATESPRACTICAL
COURSE CODE: EDU124

INDIVIDUALIZED SESSIONAL WORK: It will include the following activities:
General survey of invertebrate phyla:

1. **Protozoa:** *Amoeba*, *Euglena*, *Paramecium*, *Vorticella*, *Balantidium.*
2. **Porifera:** *Sycon, Spongilla, Euplectella*, Temporary mounts of gemmules and spicules of *Sycon*.
3. **Coelenterata:** *Hydra, Obelia, Physalia, Aurelia, Metridium, Madrepora, Favia, Fungia, Bougainvillea.*
4. **Ctenophora:** One specimen/slide
5. **Platyhelminthes:** *Planaria, Fasciola* (W.M.), larval stages of *Fasciola, Taenia* (scolex, proglottids-mature and gravid),
6. **Nemathelminthes:** *Ascarislumbricoides* (male and female)
7. **Annelida:** *Pheretima, Lumbricus, Nereis, Heteronereis, Polynoe, Aphrodite, Amphitrite, Arenicola, Hirudinaria.*
8. **Arthropoda:** *Peripatus, Lepisma, Periplanata*, mouth parts of *Periplanata*, Grasshopper, *Praying mantis*, Termite (queen and other castes), Butterfly, Beetle, Honeybee, Crab, Prawn, *Apus*, *Limulus*, Spider, Millipede, Centipede, Cypris, Cyclops, Daphnia, Prawn.
9. **Mollusca:** *AnodontaPecten, Haliotis, Pila*, Octopus, Nautilus, Chiton; *Glochidium* larva and radula of *Pila*.

SUBMISSION OF A PROJECT REPORT ON ANY OF THE FOLLOWING TOPICS:

- Coral Reefs
- Larval forms of crustacean/molluscs/echinoderms

Note: The above mentioned practicals are in accordance with the guidelines of UGC. Practicals involving animal material will be conducted using models/charts/e-resources. Minor modifications in the curriculum are allowed subject to the availability of resources.

ABILITY ENHANCEMENT COMPULSORY COURSE
(BASIC COMMUNICATION SKILLS)

L	T	P	CR
3	0	0	3

COURSE NAME: ENGLISH COURSE CODE: EDU151B
OBJECTIVES: The student teachers will be able to:

- Enhance their vocabulary and comprehension skills through the prescribed texts.
- Enhance reading and writing skills.
- Develop their skills in written communication through language use.
- Communicate effectively and appropriately in real life situations.
- Use English effectively for study purpose across the curriculum.
- Develop skills in appreciating, analysing, discussing texts dealing with socially relevant themes.
- Develop and integrate the use of four language skills i.e., reading, listening, speaking and writing.
- Develop a wide vocabulary and be able to summarize ideas.
- To read and analyze texts and display competence in written communication.
- Show a considerable understanding of English Grammar.
- Demonstrate sensitivity to cultural differences while communicating

UNIT- I APPLIED GRAMMAR (IN SOCIO- CULTURAL CONTEXT)

a. Communication and its types: Verbal and Non-verbal
b. Barriers to communication
c. Role plays (situational and behavioral) in Lab.
d. Group Discussion in Lab.

UNIT- II READING (COMMUNICATIVE APPROACH TO BE FOLLOWED)

a. Dialogue making (in bank, at railway etc.) in Lab.
b. Short films review in Lab.

c. Précis
d. Paragraphs (Fill in the blanks)

UNIT- III VOCABULARY ENHANCEMENT AND GRAMMAR PRACTICE

- Error correction in sentences (Parts of Speech)
- Rewrite jumbled words into meaningful sentences (Tenses)
- Online Practice Worksheets in Lab.

(Prescribed book: Padhey, Sudhir S. *English Grammar and Writing Skills.* Chennai: Notion Press, 2017. Print.)

UNIT- IV TECHNICAL WRITING

- Notice: Format, Characteristics, and 5 W 's.
- Email: Structure, Characteristics of Effective Emails, and Advantages in Lab.
- Letters: Formal.

TEACHING METHODOLOGY

a. **Applied Communication:** Communication theory must be taught descriptively and practically in socio-cultural context. The contextual teaching of communication will make students to deal effectively in real life situations. The learner will improve inter- personal skills.

b. **Lab. activities:** Activities like role play, group discussion guided by the communicative approach are characterized by trying to produce meaningful and real communication, at all levels. Some of the strategies that should be adopted are as follows:

- Give students opportunities to talk in real time situation.
- Regularly assign communicative activities in the classroom.

c. **Writing**: It is important for students to write effectively in proper formats. Some of the strategies that should be adopted are as follows:

- Provide guidance throughout the writing process, i.e., Pre-Writing, Drafting, Revising, Editing, and Publishing.
- Encourage students to improve technical skills in writing

d. **Testing**: The examinations will be conducted as per norms of the university.

TRANSACTIONAL MODALITIES

Communicative/Interactive and Constructivist approaches, imparting knowledge by means of creating situations. Teaching and learning of the course will be through a student-centred approach. Different interactive strategies, such as group discussions, presentations, and assignments will be applied to promote creativity. Independent learning will also be encouraged through class assignments. The course readings will be provided to students at the start of the course to inculcate the habit of reading. This will also help to raise the level of in-class discussion and make the course more dynamic.

SUGGESTED READINGS

a. Books

1. Padhey, Sudhir S. *English Grammar and Writing Skills.* Chennai: Notion Press, 2017. Print
2. Hosler, Mary Margaret. *English Made Easy*. Delhi: McGraw, 2013. Print.
3. Koneru, Aruna. *Professional Communication*. Delhi: McGraw, 2008. Print.
4. Mahanand, Anand. *English for Academic and Professional Skills*. Delhi: McGraw, 2013. Print.
5. Rani, D Sudha, TVS Reddy, D Ravi, and AS Jyotsna. *A Workbook on English Grammar and Composition*. Delhi: McGraw, 2016. Print.
6. Rizvi, M. Ashraf. *Effective Technical Communication*. Delhi: McGraw, 2018. Print.
7. Sharma, R.C. and Krishna Mohan. *Business Correspondence and Report Writing*. Delhi: McGraw, 2013. Print.
8. Tyagi, Kavita and Padma Misra. *Basic Technical Communication*. Delhi: PHI Learning, 2013. Print.

b. Websites

1. www.youtube.com (to watch standard videos)
2. http://learnenglish.britishcouncil.org/en
3. https://owl.english.purdue.edu/

ABILITY ENHANCEMENT COMPULSORY COURSE
(BASIC COMMUNICATION SKILLS)

COURSE NAME: PUNJABI
COURSE CODE: EDU151C

L	T	P	CR
3	0	0	3

OBJECTIVES

- fJ; g/go dkwzst ejkDh s/ eftsk dhnK g[;seK dk fBeN nfXn?B eoBk j?.
- ftfdnkoEhnK B{z b/ye d/ ihtB s'A GKs ikD{ eotkT[Dk j?.
- gzikph ;kfjs ftZu b/yeK dh G{fweK pko/ ikDekoh d/Dk j?.
- ouBktK ftZu'A ftukoK B{z rqfjD eoB dh ;{M g?dk eoBk j?.
- ;kfjs o{gK ns/ nbzekoK ;zpzXhikDekoh d/Dk j?.
- ਾਠਕ੍ਰਮ

1. nkX[f[fBe ekft-- ;zrzw, ;zgk -vkH ;[fszdof;zx B{o, gpbhe/PB fpT{o', gzikp :B{htof;Nh, uzvhrVQ
2. eEk ejkDh, ;zgkH vkHXBtzs e"o, gpbhe/PB fpT{o', gzikp :{Bhtof;Nh, uzvhrVQ
3. eth dkihtB, ouBk ns/ :'rdkB
4. bx{ gqPB
5. tnkeoD

COURSE CONTENT

UNIT-I

- nkX[fBe ekft- ;zrw g[;se ftZu'A gq;zr ;fjs ftnkfynk (d' ftZu'A fJZe)
- eftsk dk e/Adoh Gkt dZ; e/ ;ko (d' ftZu'A fJZe)

UNIT-II

- eEk -ejkDh (gfjbhnK S/ ejkDhnK d/ gq;zr ftZu) ftZu'A fe;/ fJZe ejkDh dk ;ko (fszB ftZu'A fJe)
- fBoXkos ethnK ftZu'A fe;/ fJe dk ihtB, ouBk ns/ ;kfjse :'rdkB (g{oB f;zx, w'jB f;zx, ;[oihs
- gkso, nzfwqsk gqhsw, ਸ਼ਿਵe[wko pNkbth) (fszB ftZu'A fJe)

UNIT-III

- nkX[fBe ekft ;zrw ns/ eEk p'X (gfjbhnK S/ ejkDhnK d/ gq;zr ftu) T[go nkXkfos bx{ gqPB

UNIT-IV

- b/y (500 ਿਬਦਾਂ ਸ਼ਵਚ) ubzs wkwfbnK, ;wkfie w;fbnK, ਭਾਿਾ ns/ gzikph ;fGnkuko Bkb ;zpzfXs (uko ftZu'A fJe)
- ftPokw fuzBQ
- ਿੁਧ-ਅਿੁਧ ns/ nr/so- fgS/so

TRANSACTIONAL MODALITIES

Communicative/Interactive and Constructivist approaches, imparting knowledge by means of creating situations. Teaching and learning of the course will be through a student-centred approach. Different interactive strategies, such as group discussions, presentations, and assignments will be applied to promote creativity. Independent learning will also be encouraged through class assignments. The course readings will be provided to students at the start of the course to inculcate the habit of reading. This will also help to raise the level of in-class discussion and make the course more dynamic.

SUGGESTED READINGS

1. ethnK dhnK eftsktK nbZr- nbZr ekft ;zrqfjnK ftZu'A bJhnK ikDrhnK.
2. eEk p'X- ;zgkokw ;o{g nDyh (2006), gpbhe/PB fpT{o' uzvhrVQ
3. gzikphਭਾ਼ਾfbgh ns/ ftnkeoB – vkHਹod/t f;zx frZb(2006) b'e rhs gqekPB, b[fXnkDk.
4. gzikph nfXn?B s/ nfXnkgB d/ w[Yb/ ;zebg – ihs f;zx i'Ph (1999), tko;f਼kj ckT{Av/PB nzfwqs;o
5. gzikph ;kfjs dh T[sgsh s/ ftek; - gofwzdof;zx, feogkbf;zx e;/b(1968), bkj"o p[ZePkg b[fXnkDk
6. nkX[fBe gzikph ;kfjs dh o{go/yk (1850 s'A 1970) - i'frzdof;zx(2002) gpbhe/PB fpUo', gzikph :{Bh, gfNnkbk
7. gzikph ;kfjs dk fJfsjk; - (nkX[fBe ekb 1901 s'A 1995 sZe)- vk ai;ftzdo f;zx, vka wkB f;zx YhAv;k(1997), gpbhe/PB fpU[o', gzikph :{Bh agfNnkbk
8. nkX[fBe gzikph eftsk -gfotosB s/ gqftoshnK- vka G{fgzdo e"o (2004), sob'uB gpfb;oi, uzvhrVQ.
9. nkX[fBe gzikph ekft XkoktK d/ ftukoXkokJh nkXko – vka eowihs f;zx(1983), r[o{ BkBe d/t :{Bha nzfwqs;o
10. nkX[fBe gzikph eftsk dk ;[ji Pk;so- vka :'roki(1998), Gkosh- ro[g nkc gpbhe/PB, uzvhrVQ.
11. gzikph ftnkeoD- p{Nk f;zx prV, tko;f਼kj ckT{Av/PB, nzfwqs;o.
12. Gqrshtkd -vkH;[fozdo e[wko dt/Pto (2008), b'erhs gqekPB, b[fXnkDk.

ABILITY ENHANCEMENT COMPULSORY COURSE (BASIC COMMUNICATION SKILLS)

COURSE NAME: HINDI
COURSE CODE:EDU151D
OBJECTIVES:

L	T	P	CR
3	0	0	3

- निर्धारितग्रंथोंकेमाध्यमसेछात्रोंकीशब्दावलीऔरसमझकौशलकोबढ़ाना।
- छात्रोंकेपढ़नेऔरलेखनकौशलकोबढ़ाना।
- शिक्षार्थियोंकोवास्तविकजीवनमेंबैठकोंमेंप्रभावीढंगसेऔरउचिततरीकेसेसंवादकरनेमेंसक्षम बनाना।
- पाठ्यक्रममेंअध्ययनकेउद्देश्यकेलिएहिंदी का प्रभावीढंगसेउपयोगकरना।
- हिंदीकेसामाजिक-सांस्कृतिकपहलूकेबारेमेंछात्रोंकोजागरूककरना।
- भाषा के माध्यम से अपने सम्प्रेषण कौशल का विकास कर सकेंगे।
- चारभाषाकौशलकेउपयोगकोविकसितऔरएकीकृतकरनायानीपढ़ना, सुनना, बोलनाऔरलिखना।

COURSE CONTENT UNIT- I

1. ih<dI swihËX kw eiqhws (kyvl Awidkwl)[Awidkwl kw nwmkrx, piriáiQqXW, pRv÷iÁXW, c<dvrdwe~ AOr anky p÷ÌvIrwj rwso kI pRmwixkqw/ApRmwixkqw[

UNIT- II

1. स्वरऔरव्यंजन
2. ÛXwkrx : s<zw, sv~nwm, ikRXw, ivSy†x, ikRXw-ivSy†x
3. वाक्य सरंचना

UNIT- III

 dIipkw (AwDuink ihNdI kwÛX) : sMpw. fW. Hymrwj inm~m, p<jwbI ivÜviv´wlX pRkwSn[inDw~irq apro#q puáqk my< sy inMniliKq C: kivXo< kI inDw~irq kivqwE<

1. jXS<kr pRswd : Aw<sU, pRym piQk
2. sUX~kw<q iZpwTI 'inrwlw' : jUhI kI klI, iB@uk, ivDvw
3. suimZwn<dn p<q : qwj, Bwrq mwqw
4. AzyX : myrw cyhrw adws, svyry aTw qo
5. svy~ÜvrdXwl s#synw : ivgq ÎXwr, poátr AOr AwdmI
6. kydwrnwQ is<h : Pwgun kw gIq, Swrd pRwQ, bwdl Ao

dIipkw :- AwlocnwËmk pRÜn (kiv/lyKk-pircX/rcnw kw swr/rcnw smI@w, a¨yÜX, cirZ-icZx Awid)

UNIT- IV

 Qky pWv (apNXws): BgvqIcrx vmw~, rwjpwl E&f sNj, idØlI [

Qky pWv: AwlocnwËmk pRÜn (kiv/lyKk-pircX/rcnw kw swr/rcnw smI@w,a¨yÜX,cirZ-icZx Awid)

TRANSACTIONAL MODALITIES

Communicative/Interactive and Constructivist approaches, imparting knowledge by means of creating situations. Teaching and learning of the course will be through a student-centred approach. Different interactive strategies, such as group discussions, presentations, and assignments will be applied to promote creativity. Independent learning will also be encouraged through class assignments. The course readings will be provided to students at the start of the course to inculcate the habit of reading. This will also help to raise the level of in-class discussion and make the course more dynamic.

ABILITY ENHANCEMENT COMPULSORY COURSE (ENVIRONMENTAL STUDIES)

COURSE NAME: ENVIRONMENTAL STUDIES

COURSE CODE: EDU152

L	T	P	CR
2	0	0	2

OBJECTIVES: To enable the student teachers to:

- Understand the meaning, scope and importance of environment education.
- Study the aspects of environmental problems.
- Recognize the potential impacts of global ecosystem and its inhabitants, solutions for these problems as well as environmental ethics which they should adopt to attain sustainable development.
- Comprehend structure and function of ecosystem.
- Understand the levels of biological diversity, genetic, species and ecosystem diversity.
- Know the causes of Environmental Pollution.
- Understand different Environmental Policies and Practices.
- Study the role of human Communities towards Environment.

COURSE CONTENT

UNIT- I

Introduction to Environment

- Definition, components and types of Environment.
- Meaning of Environmental studies and its Multidisciplinary nature.
- Scope and importance; concept of sustainability and sustainable development.

Natural Resources: Renewable and Non- Renewable Resources

- Land resources and land use change; Land degradation, soil erosion and desertification.
- Deforestation: Causes and impacts due to mining, dam building on environment, forests, biodiversity and tribal population.
- Water: Use and over- exploitation of surface and ground water, floods, droughts.
- Energy resources: Renewable and non- renewable energy sources, use of alternate energy sources.

UNIT- II

Ecosystems

- Concept of Ecosystem, Structure and function of ecosystem; Energy flow in an ecosystem: food chains, food webs and ecological succession.

a) Forest ecosystem
b) Grassland ecosystem
c) Desert ecosystem
d) Aquatic ecosystem

Biodiversity and Conservation

- Levels of biological diversity: genetic, species and ecosystem diversity;
- Biogeographic zones of India.
- Endangered and endemic species of India.
- Threats to biodiversity: Habitat loss, poaching of wildlife, man- wildlife conflicts; Conservation of biodiversity: In- situ and Ex- situ conservation of biodiversity.

UNIT- III

Environmental Pollution

- Environmental Pollution: Types, Cause, Effects and control; Air, Water, Soil and Noise Pollution.
- Nuclear hazards and human health risks.

Environmental Policies & Practices

- Climate change, global warming, ozone layer depletion, acid rain and impact on human communities and agriculture.
- Environment Laws: Environment Protection Act; Air (Prevention and control of Pollution) Act; Water (Prevention and control of Pollution) Act; Wildlife Protection Act; Forest Conservation Act.

UNIT- IV

Human Communities and the Environment

- Human Population growth: Impacts on environment, human health and welfare.
- Disaster management: Floods, earthquake, cyclones and landslides.
- Environmental movements: Chipko, Silent valley.
- Environmental ethics: Role in environmental conservation.

INDIVIDUALIZED SESSIONAL WORK: It will include the following activities:

1. Visit to an area to document environmental assets: River/ Forests/ Flora/ Fauna etc.
2. Visit to a local polluted site- Urban/ Rural/ Industrial/ Agricultural.
3. Study of common plants, insects, birds and basic principles of identification.
4. Study of simple ecosystems- Pond, River etc.
5. Prepare a report on case studies related to different components of syllabus.

TRANSACTIONAL MODALITIES

Communicative/Interactive and Constructivist approaches, imparting knowledge by means of creating situations. Teaching and learning of the course will be through a student-centred approach. Different interactive strategies, such as group discussions, presentations, and assignments will be applied to promote creativity. Independent learning will also be encouraged through class assignments. The course readings will be provided to students at the start of the course to inculcate the habit of reading. This will also help to raise the level of in-class discussion and make the course more dynamic.

SUGGESTED READINGS

1. Carson, R. (2002). Silent Spring. Houghton Mifflin Harcourt.
2. Gadgil, M., & Gyga, R. (1993). *This Fissured Land: An Ecological History of India*. University of California Press.
3. Gleeson, B., & Low, N. (eds.) (1999). Global Ethics and Environment, London, Routledge.
4. Glelok, P. H. (1993). Water in Crisis. Pacific Institute for Studies in Dev., Environment and Security. Stockholm Environmental Institute, Oxford Univ. Press.
5. Groom, Martha, J., Gary K. Meffe, & Carl Ronal Caroll (2006). *Principles of Conservation Biology*. Sunderland: Sinauer Associated.
6. Grumbine, R. Edward, & Pandit, M. K. (2013). Threats from India 's Himalaya dams. Science, 339: 36-37.
7. McCully, P. (1996). Rivers no more: the environmental effects of dams (pp. 29- 64). Zed. Books.
8. McNeill, John, R. (2000). Something New Under the Sun: An Environmental History of the Twentieth

Century.
9. Odum, E. P., Odum, H. T., Andrews, J. (1971). Fundamentals of Ecology. Philadelphia: Saunders.
10. Pepper, I. L., Gerba, C. P., & Brusseau, M. L. (2011). Environmental and Pollution Science. Academic Press.
11. Rao, M. N., & Datta, A. K. (1987). Waste water treatment. Oxford and IBH Publishing Co. Pvt. Ltd.
12. Raven, P. H., Hassenzahl, D. M., & Berg, L. R. (2012). Environment. 8th Edition. John Wiley & Sons.
13. Rosencranz, A., Divan, S., & Nobel, M. L. (2001). Environmental law and policy in India. Tripathi.
14. Sengupta, R. (2003). Ecology and Economics: An approach to sustainable development. OUP.
15. Singh, J. S., Singh, S. P., & Gupta, S. R. (2014). Ecology, Environmental Science and Conservation. New Delhi: S. Chand Publishing,
16. Sodhi, N. S., Gibson, L., & Raveb, P. H. (eds.) (2013). Conservation Biology: Voices from the Tropics. John Wiley & Sons.
17. Thapar, V. (1998). Land of the Tiger: A Natural History of the Indian Subcontinent.
18. Warren, C. E. (1971). Biology and Water Pollution Control. WB Saunders.
19. Wilson, E. O. (2006). The Creation: An appeal to save life on earth. New York: Norton.

FIELD ENGAGEMENT / INTERNSHIP / DEVELOPING CRITICAL SKILLS

COURSE NAME: TEACHER ASSISTANCE

COURSE CODE: EDU131B

L	T	P	CR
0	0	1	1

Duration: 1Week

Teacher assistant (also known as teacher 's aides) work with teachers and children and perform a wide variety of tasks. Teacher assistant typically performs a well- blended combination of non- instructional and instructional duties, while working under the supervision of the teacher. These assistants work with individual students or small groups of students to provide more specialized instruction and tutoring.

*Pupil teacher will provide assistance to the teacher by:

- Carrying out routine duties
- Working with children on their lessons
- Handing out materials
- Providing general supervision
- Recording grades/ marks
- Setting up equipment
- Review homework assignments
- Keep attendance records
- Help with coursework
- Help children with their reading and writing abilities
- Monitoring school campus behavior

*** These are suggestive. More activities can be added as per the requirement of the school.**

Semester- II

COURSE	COMPONENT	NATURE	COURSE CODE	COURSE NAME	DISTRIBUTION OF HOURS			TOTAL CREDITS
					LECTURE	TUTORIAL	PRACTICAL	
1.	Perspectives in Education	Compulsory	EDU102	Early childhood, Childhood and Growing up	6	0	0	6
2.	Core Course	Compulsory	EDU161/ EDU165	Botany/ Physics	4	0	0	4
3.	Core Course	Compulsory	EDU162/EDU166	Botany Practical/Physics Practical	0	0	3	2
4.	Core Course	Compulsory	EDU163/ EDU167	Zoology/ Mathematics	4/6	0	0	4/6
5.	Core Course	Compulsory	EDU164	Zoology Practical	0	0	3	2
6.	Core Course	Compulsory	EDU168	Chemistry	4	0	0	4
7.	Core Course	Compulsory	EDU169	Chemistry Practical	0	0	3	2
8.	Ability Enhancement Compulsory Course	Compulsory (One of three)	EDU191/ EDU192/ EDU193	Basic Communication Skills- English/ Punjabi/ Hindi	3	0	0	3
9.	Ability Enhancement Compulsory Course	Compulsory	EDU194	Environmental Studies	2	0	0	2
10.	Field Engagement / Internship/ Developing Critical Skills	Compulsory	EDU180	Interacting child ‘s parents	0	0	1 Week	1
GRAND TOTAL								**30**

PERSPECTIVES IN EDUCATION

COURSE NAME: EARLY CHILDHOOD, CHILDHOOD AND GROWINGUP
COURSE CODE: EDU102

L	T	P	CR
6	0	0	6

OBJECTIVES: At the end of semester, students will be able to:

- Discuss physical, cognitive, and emotional development that occurs from infancy through childhood
- Discuss physical, cognitive, and emotional development that occurs during adolescence
- Discuss physical, cognitive, and emotional development that occurs in adulthood
- Reflect on the role of socio- cultural context in shaping human development.
- Identify various perspectives of childhood
- Understand adolescence stage of human development**.**
- Understand problems of childhood and adolescence and their assessment and treatment.

COURSE CONTENT

UNIT- I: Early childhood

- Physical development in Early childhood.
  - Body growth: Brain development, Influences on physical growth and health
  - Motor development
- Cognitive development in Early childhood
  - Information processing
  - Language development and speech
- Emotional and Social development in Early childhood.
  - Self- Understanding
  - Emotional development
  - Peer relations
  - Foundations of Morality

UNIT- II: Middle childhood

- Physical development in Middle childhood
  - Body Growth
  - Health Issues
  - Motor Development and Play
- Cognitive development in Middle childhood
  - Information processing
  - Individual differences in mental development
  - Language development
  - Learning in school
- Emotional and Social development in Middle childhood.
  - Self- Understanding
  - Emotional development
  - Understanding others: Perspective taking
  - Moral development
  - Peer relations
  - Family influences
  - Some common problems of development
- Challenges and Solutions for the Safety of Children in the Community

UNIT III: Adolescence

- Physical development in adolescence
  - Puberty- The physical transition to adulthood
  - The Psychological impact of Pubertal events
  - Health issues
- Cognitive development in adolescence
  - An Information- Processing view of Adolescent cognitive development
- Emotional and social development in adolescence

- Alienation
- Identity crisis
- Interpersonal relationships
- Moral development
- Career choices
- The family
- Peer relations
- Brain drains
- Impact of Media

UNIT IV: Childhood and Adolescence problems: Assessment and Treatment

- Assessment and treatment of childhood problems (Behavioural and psychosocial):
  - Managing common problems: Eating problems, Toileting, Habits and Tics, Sleep, Sexuality and Sexual Problems, Depression, Disruptive Behaviour.

- Assessment and treatment of adolescence problems (Behavioural and psychosocial):
  - Problems of adjustment, Understanding of emotional disturbance and risk behaviour, Identity Crisis, Parent child conflict, Emotional Problems, Juvenile delinquency, School Attendance Problems, Anorexia Nervosa, Drug Abuse, Attempted Suicide, Internet addiction

INDIVIDUALIZED SESSIONAL WORK: It will include the following activities:

1. Observe children during their playtime in your practicing school (or nearby school) for a week; observe their play activities, relationships, communication with their peers. On the basis of that prepare a report about understanding childhood.
2. Prepare a case study of a girl child from a minority community or a Dalit household or a tribal community.
3. Observe and interact with ten adolescent children living in different contexts (rural areas, urban slum, Dalit household, tribal community, urban area, and working/street people) and compare their characteristics and problems.
4. View any two movies out of the following (The list is only suggestive not prescriptive)
   - Smile Pinky (2008)
   - Born into Brothels (2014)
   - Salaam Bombay (1988)
   - Slum dog Millionaire (2009)
   - Gippie (2013)

   Discuss their content, picturization, characters in the context of issues and concerns of childhood/adolescence
5. Collect five stories that children are told by elders from their nearby community. Discuss them in your class.

TRANSACTIONAL MODALITIES

Communicative/Interactive and Constructivist approaches, imparting knowledge by means of creating situations. Teaching and learning of the course will be through a student-centred approach. Different interactive strategies, such as group discussions, presentations, and assignments will be applied to promote creativity. Independent learning will also be encouraged through class assignments. The course readings will be provided to students at the start of the course to inculcate the habit of reading. This will also help to raise the level of in-class discussion and make the course more dynamic.

SUGGESTED READINGS

1. Cole, M and Cole, S (1989*). The Development of Children,* Scientific American Books, New York
2. Hurlock, E.B. (2003). *Child Growth and Development*, Tata Mc Graw - Hill Education
3. Kakkar, S (1978). *The Inner World: A Psychoanalytic Study of Childhood and Society in India*. Oxford University Press, New Delhi
4. Mishra, A (2007). Everyday Life in a Slum in Delhi. In D.K. Behera (Ed.) *Childhood in South Asia*. New

Delhi: Pearson Education India
5. Nambissan, G.B. (2009). *Exclusion and Discrimination in Schools: Experiences of Dalit Children*. Indian Institute of Dalit Students and UNICEF
6. Piaget, J. (1997). Development and Learning. In M. Gauvain and M. Cole (Eds), *Readings on the Development of Children*. New York: WH Freeman and Company
7. Saraswathi, T.S. (1999). Adult-Child Continuity in India: Is Adolescence a myth or an emerging reality? In T.S. Saraswathi (Ed), *Culture, Socialisation and Human Development: Theory, Research and Applications in India*. New Delhi. Sage
8. Sharma, N (2011). *Understanding Adolescence*, NBT, New Delhi, India
9. Singh, A (Ed), (2015). *Human Development: A Life Span Approach*. Orient Black Swan, Delhi
10. Aggarwal, J.C. (2009). *Essentials of Educational Psychology*. Vikas Publishing House Pvt. Ltd.: New Delhi.
11. Berk, L.E., (2000). *Childhood to Adolescence.* Mc.Graw Hill Company, London 2.
12. Berk, L.E., (2007). *Development through the life span*. Pearson Educational, New Delhi.
13. Bhatia, K.K. (2008). *Bases of Educational Psychology*. Ludhiana: Kalyani Publishers.
14. Chauhan, S.S. (2002). *Advanced Educational Psychology.* New Delhi: Vikas Publishing House.
15. Collins R (1979). *The Credential Society: An Historical Sociology of Education and Stratification.* New York: Academic Press.
16. Dash, B.N. (2004). *Theories of Education & Education in the Emerging Indian Society.* New Delhi: Dominant Publishers and Distributors.
17. Gupta D (1991). *Social Stratification*. New Delhi: Oxford University Press.
18. Mangal, S.K. (2002). *Advanced Educational Psychology.* New Delhi: Prentice Hall of India.
19. Sharma K.L. (1999). *Social Inequality in India: Profiles of Caste, Class and Social Mobility.* Jaipur: Rawat Publications.
20. Sandra Goss Lucas, Douglas A. Bernstein (2014). *Teaching Psychology: A Step-By-Step Guide,* Second Edition. Psychology press: New York.
21. Woolfolk, A. (2012)**.** *Educational Psychology*, 12/E. Pearson publisher: New Delhi.
22. Kerfooot, M, & Butler, A (1988). Problems of Childhood and Adolescence. London: MacMillan Education Ltd.
23. Schroeder, C.S., & Gordon, B. N. Assessment and Treatment of childhood problems- A Clinician 's Guide (2nd Ed.). New York: The Guilford Press.
24. Berk, L. E. (2008). Exploring Lifespan Development (1st Ed.). New York: Allyn and Bacon.

CORE COURSE (BOTANY)

COURSE NAME: GENETICS AND CELL BIOLOGY
COURSE CODE: EDU161

L	T	P	CR
4	0	0	4

OBJECTIVES: After completion of this course the student teachers will be able to;

- Understand non allelic gene interactions.
- Understand the functioning of cell organelles.
- Understand the structure, significance of nucleus and chromosomes.
- Review Mendelian inheritance in the light of gene interactions and gene expression.
- Understand chromosomal alterations and their importance.

COURSE CONTENT UNIT- I

- **Mendelism**: Mendel 's experiments and results, Mendel 's Laws of Dominance, Segregation and Independent assortment; Linkage: complete and incomplete linkage, linkage groups, linkage maps, importance of linkage, cytological interpretation of Mendelism.
- **Non-allelic Gene Interactions**: Dominant and recessive epistasis, supplementary genes, complementary genes, quantitative or polygenic inheritance, duplicate genes. Allelic gene interactions.

UNIT- II

- **Ultra structure and functions of a typical plant cell and its organelles**: Nucleus, Mitochondrion, Plastids, Ribosome, Endoplasmic reticulum, Golgi apparatus, Lysosomes; Structure and functions of cell wall and plasma membrane: fluid mosaic model only.
- **Cell divisions**: Mitosis and Meiosis in plants and their significance.
- **Giant chromosomes**: Polytene and Lamp brush chromosomes

UNIT- III

- Chromosome theory of heredity, Sex linked inheritance; Characteristics and examples; Cytoplasmic or extra nuclear inheritance: mitochondrial and plastid DNA.
- Chromosomal alterations (deletion, duplication, inversion, translocation) and their importance; Variations in chromosome number, (aneuploidy and polyploidy) introduction and their importance.

UNIT- IV

- DNA: Structure (Watson and Crick model), Nucleosome, types of DNA and role of DNA, Replication of DNA.
- Mutations: characteristics, types, importance, factors affecting mutations; Mutagens: Physical and chemical, mechanism of gene mutations; DNA damage and repair: Types of damage (Single base change and structural distortion), introduction to repair systems.

SUGGESTED READINGS

1. Alberts, B., Gray, D. Lewis, J. Raff, M., Roberts, K. and Watson, I.D. 1999. Molecular Biology of Cell. Garland Publishing Co., Inc., New York, USA.
2. Bhatia, K.N. and Dhand Neelam. 2013. Cell Biology and Genetics. Trueman Book Company, Jalandhar.
3. Gupta, P.K. 1999. A Text-book of Cell and Molecular Biology. Rastogi Publications, Meerut, India.
4. Wolfe, S.L. 1993. Molecular and Cell Biology. Wadsworth Publishing Co., California, USA. Paper-B: Genetics
5. Gupta, P.K. 1999. Genetics. Rastogi Publications, Meerut, India.
6. Russel, P.J. 1998. Genetics. The Benjamin/ Cummings. Publishing Co. Inc., USA.
7. Snustad, D.P. and Simmons, M.J. 2000. Principles of Genetics, John Wiley & Sons, Inc., USA.

CORE COURSE (BOTANY)

L	T	P	CR
0	0	3	2

COURSE NAME: GENETICS AND CELL BIOLOGY PRACTICAL
COURSE CODE: EDU162
INDIVIDUALIZED SESSIONAL WORK: It will include the following activities:

1. To study cell structure from onion leaf peels; demonstration of staining and mounting method.
2. Preparation of temporary slides to show different stages of mitosis from root tips of *Allium cepa* and *A. sativum*.
3. Preparation of temporary slides to show different stages of meiosis from floral buds of *Allium/ Brassica*.
4. Problems related to Mendalism and gene interactions.

CORE COURSE (PHYSICS)

L	T	P	CR
4	0	0	4

COURSE NAME: OPTICS
COURSE CODE: EDU165

COURSE CONTENT UNIT- I

- **Wave Optics**: Electromagnetic nature of light, Definition and Properties of wave front, Huygens Principle.
- **Interference**: Interference: Division of amplitude and division of wave-front, Young's Double Slit experiment, Lloyd's Mirror and Fresnel's Biprism, Phase change on reflection: Stokes' treatment, Interference in Thin Films, parallel and wedge-shaped films, Fringes of equal inclination (Haidinger Fringes); Fringes of equal thickness (Fizeau Fringes), Newton's Rings: measurement of wavelength and refractive index, Michelson's Interferometer: Idea of form of fringes, Determination of wavelength, Wavelength difference, Refractive index, and Visibility of fringes.

UNIT- II

- **Diffraction**: Difference between Fresnel and Franunhoffer diffraction, Fraunhofer diffraction- Single slit; Double Slit. Multiple slits and Diffraction grating, Diffraction of N slits and its discussion, Diffraction grating, Missing orders, dispersive power, Rayleigh Criterion for resolving power, Fresnel Diffraction: Half-period zones, Zone plate, Fresnel Diffraction pattern of a straight edge, a slit and a wire using half-period zone analysis.

UNIT- III

- **Polarization**: Transverse nature of light waves. Plane polarized light – production and analysis. Circular and elliptical polarization, Polarization by transmission and reflection, Malus Law, Brewster 's Law, Polarization by refraction, anisotropic crystals, Theory of double refraction, Elliptically and circularly polarized light, Quarter wave and half wave plates, Production and detection of polarized light.

UNIT- IV

- **LASERs:** Attenuation of light in an optical medium; thermal equilibrium; interaction of light with matter: Induced, Spontaneous and Stimulated Emissions, Einstein relations; laser beam characteristics and applications, light amplification; population in version; active medium, pumping; metastable states; principle pumping schemes; Laser Action, Components of Lasers, Types of lasers; Ruby Laser, Semiconductor Laser,

SUGGESTED READINGS

1. F. A. Jenkins and H. E. White Fundamentals of Optics, McGraw-Hill, 1976
2. H. R. Gulati and D. R. Khanna Fundamentals of Optics, R. Chand Publications, 1991
3. N. Subramanayam, B. Lal, & M. N. Avadhamulu, Textbook of Optics. New Delhi: S. Chand & Company, 2006.
4. A. Ghatak, Optics. New Delhi: Tata McGraw Hill Publication, 2008

CORE COURSE (PHYSICS)

L	T	P	CR
0	0	4	2

COURSE NAME: OPTICS PRACTICAL
COURSE CODE: EDU166

THE INDIVIDUALISED SESSIONAL WORK: it will include the following activities:

1. To determine the Refractive Index of the Material of a given Prism using Sodium Light
2. To determine the Dispersive Power of the Material of a given Prism using Mercury Light.
3. To determine the Resolving Power of a Prism.
4. To determine wavelength of sodium light using Fresnel Biprism.
5. To determine wavelength of sodium light using Newton's Rings.
6. To determine the Thickness of a Thin Paper by measuring the Width of the Interference Fringes produced by a Wedge-Shaped Film.
7. To determination Wavelength of Sodium Light using Michelson 's Interferometer.
8. To determine the wavelength of Laser light using Diffraction of Single Slit.

9. To determine the wavelength of (1) Sodium and (2) Mercury Light using Plane Diffraction Grating.
10. To determine the Dispersive Power of a Plane Diffraction Grating.
11. To determine the Resolving Power of a Plane Diffraction Grating.
12. To determine the (1) Wavelength and (2) Angular Spread of HeNe Laser using Plane Diffraction Grating.
13. To study the wavelength of spectral lines of sodium light using plane transmission grating.
14. To study the specific rotation of sugar solution Laurent's half shade polarimeter method.
15. To study the numerical aperture and propagation losses using HeNe laser Optical fibre set up.
16. To compare the focal length of two lenses by Nodal slide method.

CORE COURSE (ZOOLOGY)

COURSE TITLE: ANIMAL DIVERSITY II: CHORDATES

L	T	P	CR
4	0	0	4

COURSE CODE: EDU163

OBJECTIVES: The student teacher will be able to:

- Understand in respect of vertebrates– their organizational hierarchies and complexities, the evolutionary trends in external morphology and comparative studies of internal structures
- Identify and classify with examples.
- Understand various modes of adaptations in animals.

COURSE CONTENT UNIT- I

- **Introduction to Chordates:** General Characteristics; Outline classification
- **Protochordata:** General characteristics of Hemichordata, Urochordata and Cephalochordata. Hemichordates as link between non-chordates and chordates; study of larval forms in protochordates; retrogressive metamorphosis in Urochordata.

UNIT- II

- **Agnatha:** General characteristics and classification up to orders of Cyclostomes.
- **Pisces:** General characteristics of Chonrichthyes and Osteichthyes; Classification up to orders; Migration; osmoregulation and Parental care in fishes.

UNIT- III

- **Amphibia:** General characteristics and classification up to orders; Parental care in Amphibians
- **Reptilia:** General characteristics and classification up to orders; Affinities of *Sphenodon.*

UNIT- IV

- **Aves:** General characteristics and classification up to orders; Archaeopteryx- a connecting link; Principles and aerodynamics of flight; Flight adaptations; Migration in birds
- **Mammals:** General characters and classification up to order; Affinities of Prototheria; Adaptive radiation with reference to locomotory appendages.

SUGGESTED READINGS

1. Kotpal, R. L. (2012). *Text Book of Zoology- Vertebrates.* Meerut: Rastogi Publications.
2. Parker, T.J., & Haswell, W.A. (1972). *A Text Book of Zoology Vertebrates*. 7th ed. Vol. II. London: Mac Millan.
3. Dodson, E. O. (1976). *A Text Book of Zoology.* Delhi: CBS Publishers & Distributors.
4. Young, J. Z. (2004). *The Life of Vertebrates.* III Edition. Oxford university press.
5. Hall B.K. & Hallgrimsson B. (2008). *Strickberger's Evolution.* IV Edition. Jones and Bartlett Publishers Inc.
6. Dhami, P.S., & Dhami, J.K. (2006). *Chordate Zoology*. 5thed. New Delhi: R. Chand & Co.

CORE COURSE (ZOOLOGY)

L	T	P	CR
0	0	3	2

COURSE TITLE: ANIMAL DIVERSITY II: CHORDATES PRACTICAL
COURSE CODE: EDU164
INDIVIDUALIZED SESSIONAL WORK: It will include the following activities:

1. Study of Museum specimen with respect to levels and patterns of organization, biosystematics, biodiversity, adaptations, development stages, population dynamics, ecological implications etc.

a) **Hemichordata**: *Balanoglossus*.

b) **Urochordata**: *Herdmania, Pyrosoma.*

c) **Cephalochordata**: *Amphioxus.*

d) **Cyclostomata**: *Petromyzon, Myxine.*

e) **Pisces**: *Scoliodon, Sphyrna, Torpedo, Pristis, Trygon, Lepidosteus, Clarias, Ophiocephalus, Anabas, Exocoetus, Hippocampus, Tetradon, Protopterus.*

f) **Amphibia:** *Icthyophis, Necturus, Proteus, Ambystoma, Axolotl larva, Triturus. Amphiuma, Alytes, Bufo.*

g) **Reptilia:** *Testudo, Trionyx, Sphenodon, Hemidactylus, Draco, Calotes, Chamaeleon, Varanus, Heloderma, Typhlops, Eryx, Hydrophis, Viper, Bungarus, Naja, Alligator;* Identification of Venomous and Non-venomous Snakes.

h) **Aves:** *Pavo, Columba, Psitacula, Passer, Corvus, Archaeopteryx.*

i) **Mammals:** *Ornithorhynchus, Echidna, Macropus, Loris, Manis, Rattus*.

2. Study of Permanent Slides:

a) ***Balanoglossus****:* T.S. of proboscis, collar region and trunk

b) ***Amphioxus****:* T.S. or oral hood, pharynx.

c) **Mammals**: T.S. of skin, stomach, duodenum, ileum, liver, Pancreas, spleen, lungs, kidney, Testis, Ovary.

3. Osteology:

a) Study of skull bone of Frog, *Varanus*, Bird and Rabbit.

b) Study of vertebrae of Frog. *Varanus*, Bird and Rabbit.

c) Study of girdles, forelimb and hind limb bones of Frog, *Varanus*, Bird and Rabbit.

4. Dissections and/ or its demonstration through Charts/ Models/ Video/ CD/ digital alternatives etc. and/ or preparation of working models of the different system of the following animals.

a) ***Scoliodon****:* Afferent branchial systems, efferent branchial system, cranial nerves and internal ear.

b) **Frog**: Digestive, system, Urino- genital system

5. Permanent /Temporary preparation of the following-:

a) Scales: Placoid, Cycloid

b) Blood film of any vertebrate

c) Filoplumes of birds

d) Thigh muscles of frog

6. **Microtomy**: Fixing, block making, section cutting, staining, mounting and submission of slides.

Note:

- Use of animals for dissection is subject to the conditions that these are not banned under the Wildlife Protection Act or any other legislation.
- Students are required to submit the following during examination.

a. One assignment on the instrument/ technique about its principle, working, precautions and applications; and /or reagents
/solutions preparation.

b. Report on study of animals from their natural habitat from their local surroundings. Live Zoology Project Report.

CORE COURSE (MATHEMATICS)

COURSE NAME: CALCULUS
COURSE CODE: EDU167

L	T	P	CR
6	0	0	6

OBJECTIVES: To enable the student teachers to:

- Describe concept of differential calculus like definition of limit of function continuity of functions and classifications of discontinuities.
- Understand and apply the rule of successive differentiation.
- Use leibnitz theorem.
- Trace curves for cartesian and parameter coordinates.
- Use reduction for values of integral calculus like definite integral, surface of solids of revolutions.
- Compute ordinary differential equations; first order and higher degree equations solvable x.y.p
- Describe assumptions, properties and use of compute conjugate diameter hyperbola.
- Describe concepts of central coincides, paraboloids and conicoid.

COURSE CONTENT

UNIT- I DIFFERENTIAL CALCULUS

- E-S definition of the limit of a function, basic properties of limits, continuous functions and classification of discontinuities. Successive differentiation, Leibnitz theorem, indeterminate forms, asymptotes curvature, tests for concavity and convexity, points of inflexion, multiple points, tracing of curves. (Cartesian and parametric coordinates only).

UNIT- II INTEGRAL CALCULUS

- Reduction formulae: definite integrals. Quadrature and rectifications volumes and surfaces of solids of revolution

UNIT - III INTRODUCTION TO ORDINARY DIFFERENTIAL Basic definitions: order and degree of differential equation, formulation of differential equations, General, particular, explicit, implicit and singular solutions of a differential equation, integral curves, isoclines.

- First order differential equations: Linear differential equation, variables separable and equations reducible to this form, homogeneous equations and equations reducible to homogeneous form. Exact differential equations and integration factors. Bernoulli equations and Geometrical interpretation of first order differential equation, applications

UNIT- IV ORDINARY DIFFERENTIAL EQUATIONS

- Exact differential equations, first order higher degree equations solvable for x.y.p. Clairaut's form and singular solutions, geometrical meaning of a different equation, orthogonal trajectories linear differential equations with constant coefficients, homogeneous linear ordinary differential equations Linear differential equations of second order, transformation of the equation by changing the dependent variable/ the independent variable, method of variations of parameters

INDIVIDUALIZED SESSIONAL WORK: It will include the following activities:

1. Quiz based on Differential calculus, Geometry
2. Puzzles

TRANSACTIONAL MODALITIES

Communicative/Interactive and Constructivist approaches, imparting knowledge by means of creating situations. Teaching and learning of the course will be through a student-centred approach. Different interactive strategies, such as group discussions, presentations, and assignments will be applied to promote creativity. Independent learning will also be encouraged through class assignments. The course readings will be provided to students at the start of the course to inculcate the habit of reading. This will also help to raise the level of in-class discussion and make the course more dynamic.

SUGGESTED READINGS

1. Acharya, B.P. & Das R.N. (1998). Fundamentals of Differential Geometry. New Delhi: Kalyani Publishers.
2. Jain, P.K. & Kaushik, S.K. (2000). An Introduction to Real Analysis. New Delhi: S. Chand& Co.
3. Kishan, H. (2007). Integral Calculus. New Delhi: Atlantic Publishers.
4. Kishan, H. (2007). Vector Algebra and Calculus. New Delhi: Atlantic Publishers.
5. Kreyszig, E. (1999). Advanced Engineering Mathematics. New Delhi: John Wiley and Sons.
6. Muray, D.A. (1967). Introductory course in Differential Equations. New Delhi: Orient Longman.
7. Murray, R.S. (1967). Theory and Problems of Advanced Calculus. New York: Schaum Publishing Co.
8. Prasad, G. (2002). Integral Calculus. Allahabad: Pothishala Pvt. Ltd.
9. Prasad, G. (2004). Differential Calculus. Allahabad: Pothishala Pvt. Ltd.
10. Shanker, A.G. (1994). Numerical Integration of Differential Equations. New Delhi: Deep & Deep Publications.
11. Widder, F. (2008). Advanced Calculus. New Delhi: PHI Pvt. Ltd.

CORE COURSE CHEMISTRY (COMPULSORY)

COURSE TITLE: PHYSICAL CHEMISTRY- I
COURSE CODE: EDU168

L	T	P	CR
4	0	0	4

OBJECTIVES: The student teacher will be able to:

- Learn the basic concepts of Physical Chemistry.
- Understand laws of chemical thermodynamics and use them in practical life.
- Able to pursue their career objectives in advance education, scientific research and teaching.
- Understand importance of academic and laboratory skills for the undergraduate students.

COURSE CONTENT UNIT- I

Gaseous state:

- Kinetic molecular model of a gas: postulates, collision frequency; collision diameter; mean free path and viscosity of gases, including their temperature and pressure dependence, relation between mean free path and coefficient of viscosity.
- Maxwell distribution and molecular velocities (average, root mean square and most probable) and average kinetic energy, law of equipartition of energy,
- Behaviour of real gases: Deviations from ideal gas behaviour, Causes of deviation from ideal behaviour. Vander Waals equation of state,

Liquid state:

- Qualitative treatment of the structure of the liquid state; physical properties of liquids; vapor pressure, surface tension and coefficient of viscosity,

UNIT- II

Solid state:

- Nature of the solid state, law of constancy of interfacial angles, law of rational indices, Miller indices, elementary ideas of symmetry, symmetry elements and symmetry operations, qualitative idea of point and space groups, seven crystal systems and fourteen Bravais lattices; X-ray diffraction, Bragg 's law, Defects in crystals.

Ionic equilibria:

- Ionization of weak acids and bases, pH scale, common ion effect;
- Salt hydrolysis-calculation of hydrolysis constant, degree of hydrolysis and pH for different salts. Buffer solutions; derivation of Henderson equation and its applications Solubility and solubility product of sparingly soluble. Theory of acid–base indicators

UNIT- III

Chemical Thermodynamics:

- Intensive and extensive variables; state and path functions; isolated, closed and open systems; zeroth law of thermodynamics.
- *First law:* Concept of heat, *q*, work, *w*, internal energy, *U*, and statement of first law enthalpy, *H*, relation between heat capacities, calculations of *q*, *w*, *U* and *H* for reversible, irreversible and free expansion of gases (ideal and van der Waals) under isothermal and adiabatic conditions.
- *Thermo chemistry:* Heats of reactions: standard states; enthalpy of formation of molecules and ions and enthalpy of combustion and its applications; calculation of bond energy, bond dissociation energy and resonance energy from thermo chemical data
- *Second Law:* Concept of entropy; thermodynamic scale of temperature, statement of the second law of thermodynamics; Calculation of entropy change for reversible and irreversible processes.
- *Third Law:* Statement of third law, concept of residual entropy, calculation of absolute entropy of molecules.
- *Free Energy Functions:* Gibbs and Helmholtz energy; variation of S, G, A with T, V, P; Free energy change and spontaneity.

UNIT- IV

Chemical Equilibrium:

- Criteria of thermodynamic equilibrium, chemical equilibrium in ideal gases, concept of fugacity. Equilibrium constants and their quantitative dependence on temperature, pressure and concentration. thermodynamic

derivation of relations between the various equilibrium constants K_p, Kc and K_x. Le Chatelier principle (quantitative treatment);

Solutions and Colligative Properties:

- Dilute solutions; lowering of vapour pressure, Raoul's and Henry 's Laws and their applications.
- Thermodynamic derivation using chemical potential to derive relations between the four colligative properties [(i) relative lowering of vapour pressure, (ii) elevation of boiling point, (iii) Depression of freezing point, (iv) osmotic pressure] and amount of solute.

This course is intended to learn the basic concepts of Physical Chemistry Lab. The various topics of the syllabus are grouped under different units in order to bring forth importance of academic and laboratory skills for the undergraduate students.

SUGGESTED READINGS

1. Peter, A. & Paula, J. de. *Physical Chemistry 9th Ed.,* Oxford University Press, 2011.
2. Castellan, G. W. *Physical Chemistry 4th Ed.,* Narosa 2004.
3. Engel, T. & Reid, P. *Physical Chemistry 3rd Ed.,* Prentice-Hall, 2012.
4. McQuarrie, D. A. & Simon, J. D. *Molecular Thermodynamics* Viva Books Pvt. Ltd.: New Delhi, 2004.
5. Assael, M. J.; Goodwin, A. R. H.; Stamatoudis, M.; Wakeham, W. A. & Will, S. *Commonly Asked Questions in Thermodynamics.* CRC Press: NY, 2011.
6. Levine, I .N. *Physical Chemistry* 6th Ed., Tata McGraw Hill, 2010.
7. Metz, C.R. *2000 solved problems in chemistry,* Schaum Series, 2006.
8. Atkins, P. W. & Paula, J. de *Atkin's Physical Chemistry Ed*., Oxford University Press, 2006. Khosla, B. D.; Garg, V. C. and Gulati, A. *Senior Practical Physical Chemistry,* R. Chand & Co.: New Delhi, 2011.
9. Garland, C. W.; Nibler, J. W. & Shoemaker, D. P. *Experiments in Physical Chemistry 8th Ed*.; McGraw-Hill: New York, 2003.
10. Halpern, A. M. and McBane, G. C. *Experimental Physical Chemistry 3rd Ed.;* W.H. Freeman & Co.: New York, 2003.
11. Ball, D. W. *Physical Chemistry* Thomson Press, India, 2007.
12. Castellan, G. W. *Physical Chemistry* 4th Ed. Narosa, 2004.
13. Mortimer, R. G. *Physical Chemistry* 3rd Ed. Elsevier: NOIDA, UP, 2009.
14. Khosla, B. D.; Garg, V. C. and Gulati, A. *Senior Practical Physical Chemistry,* R. Chand & Co.: New Delhi, 2011.
15. Garland, C. W.; Nibler, J. W. & Shoemaker, D. P. *Experiments in Physical Chemistry 8th Ed*.; McGraw-Hill: New York, 2003.
16. Halpern, A. M. and McBane, G. C. *Experimental Physical Chemistry 3rd Ed.;* W.H. Freeman & Co.: New York, 2003.

CORE COURSE CHEMISTRY (COMPULSORY)

COURSE NAME: CHEMISTRY PRACTICAL

COURSE CODE: EDU169

L	T	P	CR
0	0	3	2

INDIVIDUALIZED SESSIONAL WORK: It will include the following activities:

1. Surface tension measurements.

Determine the surface tension by (i) drop number (ii) drop weight method.

2. **Viscosity measurement using Ostwald's viscometer**.

a. Determination of viscosity of aqueous solutions of (i) polymer (ii) ethanol and (iii) sugar at room temperature.

b. Study the variation of viscosity of sucrose solution with the concentration of solute.

3. Indexing of a given powder diffraction pattern of a cubic crystalline system.

4. pH metry

a. Study the effect on pH of addition of HCl/ NaOH to solutions of acetic acid, sodium acetate and their mixtures.

b. Preparation of buffer solutions of different pH: Sodium acetate-acetic acid, Ammonium chloride-ammonium hydroxide

c. pH metric titration of (i) strong acid vs. strong base, (ii) weak acid vs. strong base.

d. 3. Indexing of a given powder diffraction pattern of a cubic crystalline system.

4. **Thermochemistry**

a. Determination of enthalpy of hydration of copper sulphate.

ABILITY ENHANCEMENT COMPULSORY COURSE
(BASIC COMMUNICATION SKILLS)

COURSE NAME: ENGLISH
COURSE CODE: EDU191

L	T	P	CR
0	0	3	2

OBJECTIVE: At the end of semester, the students will be able to:

- To enhance students' vocabulary and comprehensive skills through prescribed texts.
- To know students 'reading skills.
- To develop literary sensibility
- To polish students 'communication abilities.

COURSE CONTENT UNIT- I

Grammar

- Murphy 's English Grammar, (Raymond Murphy), 3rd Ed. CUP 2004, Rept. 2005.Unit 1 to 25

UNIT- II

Literature-I

- Poems
  - Matilda Who told Lies, and was Burned to Death by Hillarie Belloc
  - Ode on a Grecian Urn by Keats
- One Act Play
  - Riders to the Sea by J.M. Synge
  - A Marriage Proposal by Anton Chekov

(Plays in One Act, Edited by Mohammed Elias. Madras: Orient Longman, 1985)

UNIT- III

Literature-II

- Prose
  - A Dialogue on Democracy by A.S. Hornby
  - Mass Production by G.C. Thornley
  - The Money Box by Robert Lynd

(*Selections from Modern English Prose*, Edited by Haladhar Panda. Hyderabad: University Press, 1983)

UNIT- IV

- Reading Skills Reading

Comprehension (Teacher shall cover this topic from *Communication Skills* by Sanjay Kumar and Pushp Lata, OUP, India)

TRANSACTIONAL MODALITIES

Communicative/Interactive and Constructivist approaches, imparting knowledge by means of creating situations. Teaching and learning of the course will be through a student-centred approach. Different interactive strategies, such as group discussions, presentations, and assignments will be applied to promote creativity. Independent learning will also be encouraged through class assignments. The course readings will be provided to students at the start of the course to inculcate the habit of reading. This will also help to raise the level of in-class discussion and make the course more dynamic.

ABILITY ENHANCEMENT COMPULSORY COURSE
(BASIC COMMUNICATION SKILLS)

COURSE NAME: PUNJABI
COURSE CODE: EDU192

L	T	P	CR
3	0	0	3

OBJECTIVES: At the end of semester, the students will be able to:

- fJ; g/go dk wzst ejkDh s/ eftsk dhnK g[;seK dk fBeN nfXn?B eoBk j?.
- ftfdnkoEhnK B{z b/ye d/ ihtB s'A GKs ikD{ eotkT[Dk j?.
- gzikph ;kfjs ftZu b/yeK dh G{fweK pko/ ikDekoh d/Dk j?.
- ftnkeoD ftZu PpdK d/ ftfGzB o{gK pko/ ;{M d/Dk j?. ;kfjs o{gK ns/ nbzekoK ;zpzXh ikDekoh d/Dk j?.

1eEk ejkDh, ;zgkH vkH XBtzs e"o, gpbhe/PB fpTo', gzikp :{Bhtof;Nh, uzvhrVQ

2H w/oh ihtB rkEk, dhtkB f;zx, e;s{oh bkb n?Av ;B÷, nzfwqs;o
3H ejkDheko dk ihtB, ouBk ns/ :'rdkB
4H bx{ gqPB
5H ftnkeoD

COURSE CONTENT

UNIT- I

 eEk --ejkDh (fgSbhnK S/ ejkDhnK ftZu'A) ftZu'A fe;/ fJZe ejkDh dk ਸ਼ਵਿ dZ; e/ ;ko (fszB ftZu'A fJZe)

UNIT- II

 w/oh ihtB rkEk ;t?-ihtBh ftZu'A fe;/ fJZe xNBk$eKv dk ;ko (fszB ftZu'A fJZe)

UNIT- III

 fBoXkos ejkDhekoK ftZu'A fe;/ fJe dk ihtB, ouBk ns/ ;kfjse :'rdkB (e[btzs f;zx ftoe,w'jB Gzvkoh, r[opਚਨf;zx gqhsbVh, ;[ytzs e"o wkB, ;[ikB f;zx) (fszB ftZu'A fJe)

UNIT- IV

 w/oh ihtB rkEk ns/ eEk- ejkDh (fgSbhnK d/ gq;zr ftZu) bx{ gqPB T[Zso (d; ftZu'A nZm).
(T);zy/g ouBk (gq?;h)
(n) nzro/ih s'A gzikph ftZu nB[tkd (;kfjse g?oQ/ d/ brGr 100ਿਬਦ)
(J) ;{uBk fjs B'fN; fbyDk (;kfjse, ;fGnkukoe ns/ y/v y/so Bkb ;zpzfXs ekbi dhnKrshftXhnK pko/)
(;) w[jkto/ ns/ nykD

TRANSACTIONAL MODALITIES

Communicative/Interactive and Constructivist approaches, imparting knowledge by means of creating situations. Teaching and learning of the course will be through a student-centred approach. Different interactive strategies, such as group discussions, presentations, and assignments will be applied to promote creativity. Independent learning will also be encouraged through class assignments. The course readings will be provided to students at the start of the course to inculcate the habit of reading. This will also help to raise the level of in-class discussion and make the course more dynamic.

SUGGESTED READINGS

1. ethnK dhnK eftsktK nbZr -nbZr ekft ;zrqfjnK ftZu'A bJhnK ikDrhnK.
2. eEk p'X-;zgk okw ;o{g nDyh (2006), gpbhe/PB fpT{o' uzvhrVQ
3. gzikphਭਾਿਾ fbgh ns/ ftnkeoB - vkH Pod/t f;zx frZb(2006) b'e rhs gqekPB, b[fXnkDk.
4. gzikph nfXn?B s/ nfXnkgB d/ w[Yb/ ;zebg - ihs f;zx i'Ph (1999), ਵਾਰਸਿਾਹ ckT{Av/PB, nzfwqs;o
5. gzikph ;kfjs dh T[sgsh s/ ftek; - gofwzdo f;zx, feogkb f;zx e;/b (1968), bkj"o p[ZePkg b[fXnkDk
6. nkX[fBe gzikph ;kfjs dh o{go/yk (1850 s'A 1970) - i'frzdo f;zx(2002) gpbhe/PB fpUo', gzikph :{Bh, gfNnkbk
7. gzikph ;kfjs dk fJfsjk; - (nkX[fBe ekb 1901 s'A 1995 sZe)- vka i;ftzdo f;zx, vka wkB f;zx YhAv;k (1997), gpbhe/PB fpU[o', gzikph :{Bha gfNnkbk
8. nkX[fBe gzikph eftsk -gfotosB s/ gqftoshnK -vka G{fgzdo e"o (2004), sob'uB gpfb;oi, uzvhrVQ.
9. nkX[fBe gzikph ekft XkoktK d/ ftukoXkokJh nkXko - vka eowihs f;zx (1983), r[o{ BkBe d/t :{Bha nzfwqs;o
10. nkX[fBe gzikph eftsk dk ਸੁਰਜੀਤ ਾਤਰ- vka :'roki (1998), Gkosh- ro[g nkc gpbhe/PB, uzvhrVQ.
11. gzikph ftnkeoD- p{Nk f;zx prV, ਵਾਰਸਿਾਹ ckT{Av/PB, nzfwqs;o.
12. gqrshtkd- vkH ;[fozdo e[wko dt/Pto (2008). b'e rhs gqekPB, b[fXnkDk.

ABILITY ENHANCEMENT COMPULSORY COURSE
(BASIC COMMUNICATION SKILLS)

COURSE NAME: HINDI
COURSE CODE: EDU193

L	T	P	CR
3	0	0	3

OBJECTIVES:

- Nk=ksa esa Hkk'kk dks le>us rFkk ewY;kadu djus dh n`f'V c<kuk
- "kCn lajpuk izfdz;k ds izfr Nk=ksa dk /;kukd'kZ.k djkukA
- Nk=ksa dks iz;kstuewyd fgUnh dh O;kidrk ls voxr djkukA
- fgUnh Hkk'kk dh O;ogkfjd mi;ksfxrk dk ifjp; nsukA

COURSE CONTENT

UNIT- IfgUnh lajpuk

Ik;kZ;okph] lekukFkZd] foyksekFkZd] vusdkFkZd] vusd "kCnksa ds LFkku ij ,d "kCn lewgkFkZd "kCnksa ds iz;ksx] fudVkFkhZ "kCnksa ds lw{e vFkZ&Hksn]lekukFkZd "kCnksa ds Hksn] milxZ] izR;;

UNIT- IIorZuh] fojke fpUg ,oa

- orZuh lEc/kh v"kqf);kj] ek=kvksa dh v"kqf);kj
- orZuh lEc/kh v"kqf);ks ds dkj.k] orZuh lEc/kh v"kqf);ks ds lq/kkjus mik;A
- fojke fpUg&iw.kZ fojke] iz"uokpd fpUg lEcks/ku ;k vk"p;Z fpUg] funsZ"kd fpUg] vorj.k fpUg

UNIT- IIIys[ku lEcU/kh

- fyf[kr Hkk'kk f"k{k.k ds mn~ns";
- ys[ku dh fofHkUu fof/k;kj] ys[ku ds nks'k
- fucU/k ys[ku] dgkuh ys[ku

UNIT- IVfgUnh i=kpkj ,oa ys[ku

- vkSipkfjd i=kpkj
- vukSipkfjd i=kpkj
- jk'Vªh;&vUrZjk'Vªh; rkRdkfyd ?kVukdzeksa ij ys[ku

INDIVIDUALIZED SESSIONAL WORK: It will include the following activities:

1. jktHkk'k fgUnh& xksfoUn nkl& fgUnh lkfgR; lEesyu] iz;kxA
2. jk'VªHkk'kk vkUnksyu& xksiky ij"kqjke&egkjk'Vª lHkkA
3. fojke fpUg& egsUnz jktk tSu& fdrkc?kj] fnYyh
4. iz"kklfud ,oa dk;kZy;h fgUnh& jkeizdk"k] jk/kkd`'.k izdk"ku] fnYyhA
5. iz;kstuewyd dkedkth fgUnh& dSyk"k pUnz HkkfV;k] r{kf"kyk izdk"ku] fnYyh
6. iz"kklfud fgUnh fVIi.k] izk:i.k ,oa i= ys[ku& gfjeksgu] r{kf"kyk izdk"ku] fnYyh

TRANSACTIONAL MODALITIES

Communicative/ Interactive and Constructivist approaches, imparting knowledge by means of creating situations. Teaching and learning of the course will be through a student-centred approach. Different interactive strategies, such as group discussions, presentations, and assignments will be applied to promote creativity. Independent learning will also be encouraged through class assignments. The course readings will be provided to students at the start of the course to inculcate the habit of reading. This will also help to raise the level of in-class discussion and make the course more

dynamic.

L	T	P	CR
2	0	0	2

ABILITY ENHANCEMENT COMPULSORY COURSE

COURSE NAME: ENVIRONMENTAL STUDIES
COURSE CODE: EDU194
OBJECTIVES: At the end of semester, the students will be able to:

- Understand the importance and scope of environment.
- Critically analyse, intellectual discourse and essential projects.
- Analyse sustainable environment in global world.
- Analyze and practice various practices of environment management.
- Analyze and understand environmental concerns through the process of inquiry, critical analysis, intellectual discourse and essential projects.

COURSE CONTENT
UNIT- I IMPORTANCE AND SCOPE OF ENVIRONMENT

- Importance needs and scope of Environmental Conservation and Regeneration, Structure and functions of different ecosystems, India as a mega biodiversity nation, Role of individual in conservation of natural resources: water, energy and food, Equitable uses of resources for sustainable livelihoods, the Environmental legislation: awareness and issues involved in enforcement.

UNIT- II NATURAL RESOURCES

- Community participation in natural resource management- water, forests. Sustainable land use management, Traditional knowledge and biodiversity conservation, Developmental projects including Government initiatives and their impact on biodiversity conservation.

UNIT- III PRACTICES IN ENVIRONMENT MANAGEMENT

- Consumerism and waste generation and its management, Environmental degradation and its impact on the health of people, Organic farming, Agricultural waste: their impact and management, Rainwater harvesting and water resource management, Bio medical waste management.

UNIT- IV SUSTAINABLE ENVIRONMENT IN GLOBAL WORLD

- Environmental conservation in the globalized world, Alternative sources of energy, Impact of natural disaster/ man-made disaster on the environment, Biological control for sustainable agriculture, Heat production and greenhouse gas emission, Impact of industry/ mining/ transport on the environment, Sustainable use of forest produce.

INDIVIDUALIZED SESSIONAL WORK: It will include the following activities:

1. Case studies and success stories (involve local material).
2. Problem-solving and inquiry methods
3. Small assignments which may include observation of important relevant days, preparation of bulletin board material, games, crossword puzzles, worksheet etc.
4. Setting up of Eco-clubs.
5. Conducting a seminar and developing a seminar document
6. Project work and writing of project report
7. Discussion of activities pertaining to two different classes and subjects.
8. Activities on the infusion of appropriate concerns.

TRANSACTIONAL MODALITIES
Communicative/Interactive and Constructivist approaches, imparting knowledge by means of creating situations. Teaching and learning of the course will be through a student-centred approach. Different interactive strategies, such as group discussions, presentations, and assignments will be applied to promote creativity. Independent learning will also be encouraged through class assignments. The course readings will be provided to students at the start of the course to inculcate the habit of reading. This will also help to raise the level of in-class discussion and make the course more dynamic.

SUGGESTED READINGS

1. NCERT (1981) Environmental Education at School Level. New Delhi. NCERT.
2. Odum, E.P (1971). Fundamental Ecology. London. W.B. Saunders Company.
3. Palmer, Joy A. (1998). Environmental education in the 21st Century. London. Routledge.

4. Sharma R. C and Tan, Marle C (Eds.) (1990). Resource Book in Environmental education for school lectures. Bangkok. UNESCO.
5. UNESCO (1990). Sourcebook in Environmental Education for School Teachers. Bangkok.
6. CEE (1995). The joy of learning handbook of environmental education activities. Vol. I-3 to 5. Ahmadabad. Centre for Environment Education,
7. CEE (1996) The Joy of learning. Handbook of environmental education activities. Vol.II-6 to 8. Ahmadabad: Centre for Environment Education
8. Pandya (1999). Mamta Guide to the green material: experiences and learning in developing effective environmental education material. Ahmedabad. Centre for Environment Education,
9. Sharma, R. C. (1981). Environmental Education. Delhi. Metropolitan.
10. Reddy, K. (2007). Environmental education. New Delhi. Neel Kamal Publications Pvt. Ltd.
11. NCERT (2009). Project book in Environmental Education for class VII, VII, IX, and X. New Delhi. NCERT.
12. NCERT (2011). Teachers 'Handbook on Environmental Education for the higher secondary stage. New Delhi. NCERT.
13. NCERT (2013). Project book in Environmental Education for the higher secondary stage. New Delhi. NCERT.
14. lDlsuk gfjeksgu ¼2003½- i;kZoj.k v/;;u] Jhxaxkuxj- vxzoky lkfgR; lnuA
15. iadt JhokLro ¼1998½- ^i;kZoj.kf'k{kk*- Hkksiky- e/;izns'k fgUnh xzaFk vdknehA
16. lDlsuk ,-ch- ¼1998½- i;kZoj.k f'k{kk- ubZ fnYyh- vk;Zcqd fMiksA

FIELD ENGAGEMENT / INTERNSHIP / DEVELOPING CRITICAL SKILLS

COURSE NAME: INTERACTING CHILD'S PARENTS COURSE CODE: EDU180

L	T	P	CR
0	0	1	1

Duration: 1 Week

Parents and guardians are sometimes overlooked during the process of conducting any school survey. This is problematic for several reasons, including the fact that school- aged children typically spend more time in their home environment than in school and that research suggests that parents attitude have a significant impact on academic performance.

Parent involvement and parent expectations for their children 's attainment is an important component as it influences their children 's expectations and achievement, and early expectations tend to persist throughout the child 's school years. This course will enable student- teachers to have closer look at the parent involvement and parents 'expectations, it will help them in their future profession.

Some of the important points to be kept in mind while interacting child 's parents will be to get information about:

- Parents involvement
- Parents expectations

Each pupil teacher will prepare a report and will submit it to the concerned teacher. This report will be evaluated and grades will be awarded.

Semester- III

COURSE	COMPONENT	NATURE	COURSE CODE	COURSE NAME	DISTRIBUTION OF HOURS			TOTAL CREDITS
					LECTURE	TUTORIAL	PRACTICAL	
1.	Perspectives in Education	Compulsory	EDU201	Contemporary India and Education	**6**	**0**	**0**	**6**
2.	Core Course	Compulsory	EDU213/ EDU249	Mathematics/ Zoology	**6/4**	**0**	**0**	**6/4**
3.	Skill Enhancement course	Compulsory	EDU231	Value and Ethics in Education	**2**	**0**	**0**	**2**
4.	Skill Enhancement course	Compulsory	EDU233	Guidance and Counseling	**2**	**0**	**0**	**2**
5.	Core Course	Compulsory	EDU241	Chemistry	**4**	**0**	**0**	**4**
6.	Core Course	Compulsory	EDU243	Chemistry Practical	**0**	**0**	**3**	**2**
7.	Core Course	Compulsory	EDU245/ EDU253	Botany/ Physics	**4**	**0**	**0**	**4**
8.	Core Course	Compulsory	EDU247/ EDU 255	Botany Practical/Physics Practical	**0**	**0**	**3**	**2**
9.	Core Course	Compulsory	EDU251	Zoology Practical	**0**	**0**	**3**	**2**
10.	Field Engagement/ Internship/ Developing Critical Skills	Compulsory	EDU291	Recording Best Practices in different Schools	**0**	**0**	**1 Week**	**1**
GRAND TOTAL								**29**

PERSPECTIVES IN EDUCATION

COURSE NAME: CONTEMPORARY INDIA AND EDUCATION

L	T	P	CR
6	0	0	6

COURSE CODE: EDU201

OBJECTIVES: The course will enable the student teachers to:

- Appreciate the unity and strengths of Indian diversities based on region, religion, gender, languages, socio-economic factors like caste, means of livelihood etc.
- Acquire knowledge about the salient features of our Constitution and constitutional measures to protect diversities
- Develop understanding of the issues in contemporary India like industrialization, urbanization, globalization, modernization, economic liberalization and digitalization etc.
- Appraise about the policy initiatives taken in education reform during pre- and post- independent India.
- Develop overall understanding of the working and recommendations of various Commissions and Committees constituted for improving education in the country.
- Appreciate Innovations and new measures towards universalization of education including the role of Panchayati Raj Institutions.
- Familiarize with various incentive schemes like mid- day meal, support to economically, socially and educationally backward communities
- Develop understanding of the issues, and challenges faced by Indian contemporary Society

UNIT- I CONTEMPORARY INDIA

- Types of Society-tribal, Agrarian; industrial, post- industrial society;
- Challenges in achieving universal elementary education
- Impact of Urbanization; Industrialization; Globalization, modernization, economic liberalization and digitalization etc.
- Population explosion and educational challenge: Population size; composition and distribution in India; consequences of population growth;

UNIT- II CONSTITUTIONAL PROVISIONS AND EDUCATION

- Constitutional provisions on education that reflect National ideals: Democracy and the values of equality, justice, freedom, concern for others 'wellbeing, secularism, respect for human dignity and rights.
- India as an evolving Nation: Vision, Nature and Salient Features – Democratic and Secular polity, Federal structure: Implications for educational system;
- Aims and purposes of education drawn from constitutional provision;
- Fundamental Rights & Duties of Citizens
- Decentralization of Education and Panchayati Raj (specifically though 73rd and 74th amendment)

UNIT- III POLICY FRAMEWORK FOR DEVELOPMENT OF EDUCATION IN INDIA

- Education in Post- Independence Period: Mudaliar Commission (1952); Education Commission (1964-66); NPE 1968; NPE 1986 and its modified version 1992; Knowledge Commission (2005);
- Emerging trends in the interface between
  - political process and education;
  - economic developments and education; and
  - Socio-cultural changes and education.

- Idea of Common School System
- National System of Education
- Language Policy
- Learning Without Burden-1993
- Justice Verma Commission-2012

UNIT- IV INITIATIVES OF THE GOVERNMENT OF INDIA

- Sarva Shiksha Abhiyan (SSA)
- Rashtriya Madhyamik Shiksha Abhiyan (RMSA)
- Mid-day Meal
- ICT In School Education- National Repository of Open Educational Resources (NROER)
- Pandit Madan Mohan Malaviya National Mission on Teachers and Teaching (PMMMNMTT)

Contemporary Indian Education: Concerns and Issues

- Challenges in Implementation of RTE Act 2009
- Issues of quality and equity.

(The above to be discussed with specific reference to physical, economic, social and cultural access, particularly to girl child and weaker sections as well as differently- abled children)

- ✓ School safety
- Equality of Educational Opportunity:
- ✓ Meaning of equality and constitutional provisions
- ✓ Prevailing nature and forms of inequality, including dominant and minor groups and related issues
- Inequality in schooling: Public-private schools, rural-urban Schools, single teachers 'schools and many other forms of inequalities in school systems and the processes leading to disparities

PRACTICUM

- 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
- Understanding youth culture in the present times and the impact of internet and other Visual mediums.
- Organization of Literacy Programmes (Night School/Classes) for adults and continuing education among Youths (A Pilot Project).
- Causes and Poverty and Eradication of Slum Areas/ Rural Areas.
- Presentation on the reports and policies on USE
- 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.
- Study of functioning utility of Shala, Vikas Samiti in a Secondary School.
- Study of voluntary agency working in the field of educational and school development of society.
- Conduct surveys of various educational contexts (e.g., Schools of different kinds) and make interpretative presentations based on these
- Study writings on analysis of education-development interface and make presentations
- Conduct surveys of various educational contexts (e.g., Schools of different kinds) and make interpretative presentations based on these

- Study writings on analysis of education-development interface and make presentations

TRANSACTIONAL MODALITIES

Communicative/Interactive and Constructivist approaches, imparting knowledge by means of creating situations. Teaching and learning of the course will be through a student- centred approach. Different interactive strategies, such as group discussions, presentations, and assignments will be applied to promote creativity. Independent learning will also be encouraged through class assignments. The course readings will be provided to students at the start of the course to inculcate the habit of reading. This will also help to raise the level of in-class discussion and make the course more dynamic.

SUGGESTED READINGS

1. Anand, C.L. et.al. (1983). Teacher and Education in Emerging in Indian Society, NCERT, New Delhi.
2. Govt. of India (1986). National Policy on Education, Min. of HRD, New Delhi.
3. Govt. of India (1992). Programme of Action (NPE). Min of HRD.
4. Govinda, R. (2011). *Who goes to school? Exploring exclusion in Indian education*. Oxford University Press.
5. Krishnamurti, J. (1992). Education and world peace. In *Social responsibility*. Krishnamurti Foundation.
6. Kumar, K. (2013). *Politics of education in colonial India*. India: Routledge.
7. Mani, R.S. (1964). Educational Ideas and Ideals of Gandhi and Tagore, New Book Society, New Delhi.
8. Manoj Das (1999). Sri Aurobindo on Education, National Council for Teacher Education, New Delhi.
9. Mohanty, J., (1986). School Education in Emerging Society, Sterling Publishers.
10. Mukherji, S.M., (1966). History of Education in India, Acharya Book Depot, Baroda.
11. GOI (1964-1966): _Education and National Development‖. Ministry of Education Government of India 1966.
12. GOI (2004): Learning without Burden, Report of the National Advisory Committee. Education Act. Ministry of HRD, Department of Education, October, 2004.
13. NCERT (2002): Seventh All India School Education Survey, NCERT: New Delhi.
14. Naik, J.P. (1982). *The education commission and after*. APH Publishing.
15. Naik, J.P. & Syed, N., (1974). A Student ‘s History of Education in India, MacMillan, New Delhi.
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17. NCERT. (2005). *National curriculum framework. (NCF 2005)*. New Delhi: NCERT.
18. NCERT. (2006a). *Position paper-National focus group on education with special needs*
19. NCERT. (2006b). *Position paper-National focus group on gender issues in the curriculum (NCF 2005)*. NCERT.
20. NCERT. (2006c). *Position paper-National focus group on problems of scheduled caste and scheduled tribe children (NCF 2005)*. New Delhi: NCERT.
21. NCERT. (2006d). *Position paper-National focus group on teaching of Indian language*
22. Ozial, A.O. _Hand Book of School Administration and Management ‘, London, Macmillan
23. Radha Kumud Mookerji. Ancient Indian Education (Brahmanical and Buddhist), Cosmo Publications, New Delhi– 1999.
24. Sainath P. (1996). Everybody loves a good drought. Penguin Books New Delhi.
25. Salamatullah, (1979). Education in Social context, NCERT, New Delhi.
26. Sykes, Marjorie (1988): The Story of Nai Talim, Naitalim Samiti: Wardha.
27. UNESCO; (1997). Learning the Treasure Within.
28. Dr. Vada Mitra (1967). Education in Ancient India, Arya book Depot, New Delhi

29. UNDPA. Human Development Reports. New Delhi. Oxford: Oxford University Press.

30. UNESCO. (2004) Education for All: The Quality Imperative. EFA Global Monitoring Report, Paris.

31. 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.

32. World Bank, (2004). Reaching the Child: An Integrated Approach to Child Development. Oxford University Press, Delhi.

CORE COURSE (MATHEMATICS)

COURSE NAME: ADVANCE CALCULUS AND DIFFERENTIAL EQUATIONS

COURSE CODE: EDU213

L	T	P	CR
6	0	0	6

OBJECTIVES: The student will be able to:

- State definitions of various mathematical terms required in the course.
- Derive the tests and theorems prescribed in the statement of the syllabus.
- Explain continuity with various terms.
- Prove Mean value theorem, Darboux ‘s value theorem and Taylor ‘s theorem.
- Discuss limits and continuity of two variables and various theorems related with functions of two variables prescribed in the course.
- Solve problems related with various classes of differential equations.
- Solve problems related with transformations and its details, prescribed in the syllabus.

UNIT- I

- Definition of a sequence, theorems on limits of sequences. Bounded and monotonic sequences, Cauchy's convergence criterion, Series of non-negative terms, Comparison tests, Cauchy's Integral test, Ratio test, Cauchy's Root test. Raabe ‘s Logarithmic, De Morgan and Bertrand's tests, Gauss test. Alternating series, Leibnitz's theorem. Absolute and conditional convergence

UNIT-II

- Continuity, sequential continuity, properties of continuous functions, Uniform continuity, proof of chain rule of differentiability, mean value theorems and their geometrical interpretations. Darboux ‘s intermediate value theorem for derivatives, Taylor's theorem with various forms of remainders. McLaurin and Taylor series expansions limit and continuity of functions of two variables

UNIT-III

Partial differentiation, change of variables, partial derivation and differentiability of real- valued functions of two variables. Euler ‘s theorem on homogeneous functions. Taylor's theorem for functions of two variables. Jacobians envelopes, evolutes. Maxima, minima and Saddle points of functions of two variables. Lagrange's multiplier method

GEOMETRY Conjugate diameter, conjugate hyperbola, asymptotes of a hyperbola and rectangular, special properties of parabola, ellipse and hyperbola. Polar equations of conics and equations of chords, tangents and normal ‘s only sphere, cone, cylinder Central coincides, paraboloids plane sections of coincides, generating lines, reduction of second-degree equations to standard forms

INDIVIDUALIZED SESSIONAL WORK: It will include the following activities:

1. Make an Assignment on Bessel, Legendre and Hyper geometric functions and their properties-convergence, recurrence and generating relations.
2. Make a PowerPoint Presentation on Cauchy's Root test. Raabe ‘s Logarithmic, De Morgan and Bertrand's tests, Gauss test. Alternating series, Leibnitz's theorem.

TRANSACTIONAL MODALITIES

Communicative/Interactive and Constructivist approaches, imparting knowledge by means of creating situations. Teaching and learning of the course will be through a student- centered approach. Different interactive strategies, such as group discussions, presentations, and assignments will be applied to promote creativity. Independent learning will also be encouraged through class assignments. The course readings will be provided to students at the start of the course to inculcate the habit of reading. This will also help to raise the level of in-class discussion and make the course more dynamic.

SUGGESTED READINGS

1. Apostol, T.M. (1985), Mathematical Analysis. Narosa Publishing House, New Delhi.
2. Goldberg, R.R. (1970), Real Analysis. Oxford & I.B.H. Publishing Co., New Delhi.
3. Jain, P.K. & Kaushik, S.K. (2000), an Introduction to Real Analysis. S. Chand & Co., New Delhi.
4. Klaumber, G. (1975), Mathematical Analysis. Marcel Dekkar, Inc. New York.
5. Sharma, D.R. (2009), Spectrum, Analysis Inc. Sharma Publications, Jalandhar.
6. Spiegel, M.R. (1993), Theory and Problems of Advanced Calculus. Schaum Publishing Co., New York.
7. Sundaram, D.S. & Chaudhary, B. (1997), a First Course in Mathematical Analysis. Narosa Publishing House, New Delhi.

SKILL ENHANCEMENT COURSE

COURSE NAME: VALUE AND ETHICS IN EDUCATION

COURSE CODE: EDU231

L	T	P	CR
2	0	0	2

OBJECTIVES: To enable the students to:

- Understand the nature of values, moral values and moral education
- Appreciate the contributions of great educational philosophers.

UNIT-I

- Value Education: Concept, Nature, Source & importance, Perspectives (Rational, Philosophical, Socio-Cultural, Religious and Psychological).
- Fundamental Human Values-Truth, Peace, Non-violence, Righteous Conduct.
- Value education system in India.
- Factors affecting values.

UNIT-II

- Value Crisis and conflict resolution: Concept, Positive and negative aspects of conflict, Types of conflicts, Conflict resolution, conflict management, Model of conflict resolution, Styles of conflict resolution.
- Impact of Modern Education and Media on Values and conflict resolution.

- Role of a teacher in the preservation of tradition and culture.
- Role of family, tradition and community in value development

UNIT-III

- **Ethics:** Meaning, types of ethics, importance of ethics in education.
- **Code of ethics for Educators**: AAE (Association of American Educators),
- Draft Code of Professional Ethics for school teachers in India

UNIT-IV

- The ethical teacher
- Introduction to ethics in teaching
- Teacher as a moral person and moral educator
- Dilemmas in teaching, collegial fear
- Learning to create an ethical culture
- Using ethical knowledge to inform practice
- Shared and distributed leadership in schools
- Why we need capable educational leaders

TRANSACTIONAL MODALITIES

Communicative/Interactive and Constructivist approaches, imparting knowledge by means of creating situations. Teaching and learning of the course will be through a student- centred approach. Different interactive strategies, such as group discussions, presentations, and assignments will be applied to promote creativity. Independent learning will also be encouraged through class assignments. The course readings will be provided to students at the start of the course to inculcate the habit of reading. This will also help to raise the level of in-class discussion and make the course more dynamic.

SUGGESTED READINGS

1. Adans, D. (Ed). (1997). Unesco and a Culture of peace, promoting a global movement.
2. Aggarwal, J.C. (2005) Education for values, environment and human rights. New Delhi Shipra Publication.
3. Chadha, S.C. (2008) Education value & value education. Meerut: R. Lall Books Depot.
4. Chand, J. (2007). Value education. Delhi: Anshah Publishing House.
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12. Morrison, M.L. (2003) Peace Education. Australia: McFarland.
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20. UNICEF. The State of the World Children (reports of the last five years).

21. Bhatt, S.R(1986). Knowledge, Value and Education: An Axiomatic Analysis, Delhi: Gian Pub.

22. Kar, N.N. (1996). Value Education: A Philosophical Study. Ambala: Associated Pub.

23. Khan, Wahiduddin. (2010) Family Life, Good word Books, New Delhi,

24. Kulshrestha, S.P. (1979), Emerging Value Pattern of Teachers & Value Pattern of Teachers & New Trends, Education in India, New Delhi: Light & Life Pub.,

25. Mascarenhas, M. & Justa, H.R., (1989)., Value Education in Schools and Other Essays, Delhi Konark,

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27. Sharma, S. R, (1999)., Ed., Teaching of Moral Education, N. Delhi: Cosmos, Pub.,

28. Singh, Samporn (1979) Human Values, Jodhpur: Faith Pub.,

29. Source book of Human Rights – NCERT

30. Ethics for Everyone: https://arthurdobrin.files.wordpress.com/2008/08/ethics-for- everyone.pdf

31. http://choicesvideo.net/guidebooks/aboutgoldenruleguidebook.pdf

32. Universal Declaration of Human Rights: http://www.un.org/en/documents/udhr/

33. Arnold Toynbee ‘s Challenge-Response: http://www.greenbookee.com/arnold-toynbee- challenge-and- response/

34. Life of Dr. Abdul Kalam: https://yippiie.files.wordpress.com/2011/04/wings-of- fire-by- Abdul-kalam-printers1.pdf

35. Values and UNESCO: http://unesdoc.unesco.org/images/0012/001279/127914e.pdf

36. Teaching Ethics, UNESCO:http://portal.unesco.org/shs /en/files/8735/11289332261 TeachingEthics_CopenhagenRepo

SKILL ENHANCEMENT COURSE

L	T	P	CR
2	0	0	2

COURSE NAME: GUIDANCE AND COUNSELLING

COURSE CODE: EDU233

OBJECTIVES: To enable the student teachers:

- To understand nature, scope and domains of Guidance.
- To use different tools of guidance for assessment.
- To understand principles and approaches of counselling.
- To realize the importance of guidance and counselling programmes.

UNIT-I

- **Nature and Scope of Guidance:** Philosophy and Objectives of Guidance, Tools of Guidance- (Intelligence tests, Aptitude tests, Interest inventories, Personality tests and Achievement tests)
- Role of teachers in Guidance, Functions of Guidance Services, Quality of Guidance Services.

UNIT-II

- **Domains of Guidance:** Educational Guidance: Role of Guidance Officer, Role of Government Agencies, Effective Academic Guidance.
- Vocational Guidance: Concept of Vocational Guidance, Role of Guidance Counsellor and Modern trends in Vocational Guidance.
- Personal Guidance: Concept of Personal Guidance, Guidance for personality building.

UNIT-III

- **Approaches of Counselling:** Principles of Counselling, Counselling Approaches- Directive, Non-directive therapy, Eclective and RECBT (Rational emotive cognitive behavioural therapy)
- Group Counselling/ Individual Counselling

UNIT-IV

- **Organisation of Guidance and Counselling Programmes:** Components, planning for guidance and counselling, Training of School Counsellors, Group work and Managing Guidance and Counselling Programmes.

INDIVIDUALIZED SESSIONAL WORK: It will include the following activities:

1. Impact of parenting styles on Juvenile delinquents.
2. Administering Aptitude/Interest Inventory.
3. Measurement of Motivation, Achievement motivation, Aspiration.
4. Measuring child IQ by using Jalota's mental ability test.
5. A visit to rehabilitation centre.
6. The class will be divided into groups constituting of 5 to 6 students and each team will be given an assignment to submit a report on the visit of Rehabilitation centre.
7. Group discussion on needs and importance of guidance and counselling

TRANSACTIONAL MODALITIES

Communicative/Interactive and Constructivist approaches, imparting knowledge by means of creating situations. Teaching and learning of the course will be through a student- centred approach. Different interactive strategies, such as group discussions, presentations, and assignments will be applied to promote creativity. Independent learning will also be encouraged through

class assignments. The course readings will be provided to students at the start of the course to inculcate the habit of reading. This will also help to raise the level of in-class discussion and make the course more dynamic.

SUGGESTED READINGS

1. David Capuzzi, Douglass R. Gross. (2008) Counselling and Psychotherapy. DelhiDorling Kindersley.
2. Devi, L. Encyclopedia of Child Welfare Vol (I-VI).
3. Madan, G. R. Indian Social Problems.
4. Mussen, P., Conger, J., Kagan, J. and Huston, A.C. (1990). Child development and personality. New York: Harper and Row.
5. Rane, A. (Ed.) (1994). Street children: A challenge to the social work profession. Bombay: TISS.
6. Rane, A. et al. (1980). Children in difficult situations in India: A review. Bombay: TISS. Roy, S. Shikshamanovidya.
7. Aggarwal, J. C. (2004). Educational Vocational Guidance and Counseling, New Delhi: Doaba House.
8. Bhatia, K.K. (2008). Principles of Guidance and Counselling, New Delhi: KalyaniPublihers.
9. Chauhan, S.S. (1982), Principles and Techniques of Guidance, New Delhi: Vikas Publication House.
10. Granz, R. M. (2005). Foundations and Principles of Guidance, Boston: Allyn & Bacon.
11. Gupta, V. K. (2004). Educational Guidance and Counselling, Ludhiana: Ankur Publications.
12. Jones, J. A. (1970). Principles of Guidance, New York: McGraw Hill.
13. Kocher, S. K. (2007). Educational Guidance and Counselling, New Delhi: Sterling Publishers.
14. Myres, G. E. (2005). Principles and Techniques of Vocational Guidance, New York: McGraw Hill.
15. Nayak, A.K. (1997), Guidance and Counselling. New Delhi: APH Publishing Corporation.
16. NCERT (2008). Counselling Process and Strategies (Module 2). New Delhi: NCERT
17. NCERT (2008). Guidance for Human Development and Adjustment (Module 3). New Delhi: NCERT.
18. NCERT (2008). Introduction to Guidance (Module 1). New Delhi: NCERT
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20. Sharma, R.A. (2008). Fundamentals of Guidance &Counselling, Meerut: R Lall Book Depot.
21. Shertzer, B. & Stone, S. C. (1974). Fundamentals of Counselling, London: Houghton Missli.
22. Shirley, A. H. & Guilford, E. (1987). Guidance in the Secondary Schools, New Delhi: NCERT.
23. Sidhu, H.S. (2005). Guidance and Counselling, Patiala: Twenty first century Publications.
24. Strang, R. (2005). Counselling Techniques in Colleges and Secondary Schools, New York: Harper
25. Suri, S.P. and Sodhi, T.S. (2000). Guidance and Counselling, Patiala: Bawa Publishers.

CORE COURSE
(CHEMISTRY)

L	T	P	CR
4	0	0	4

COURSE NAME: ORGANIC CHEMISTRY-I

COURSE CODE:EDU241

OBJECTIVES: This course is intended to learn the

- Basic concepts of Organic Chemistry.
- The various topics of the syllabus are grouped under different units in order to bring forth importance of academic and laboratory skills for the undergraduate students.

UNIT- I BASICS OF ORGANIC CHEMISTRY

- *Organic Compounds:* Classification, and Nomenclature, Hybridization, Shapes of molecules, Influence of hybridization on bond properties.
- *Electronic Displacements:* Inductive, electromeric, resonance and mesmeric effects, hyper conjugation and their applications; Dipole moment; Organic acids and bases; their relative strength.
- Hemolytic and Heterolysis fission with suitable examples. Curly arrow rules, formal charges; Electrophiles and

Nucleophiles; Nucleophlicity and basicity; Types, shape and their relative stability of Carbocations, Carbanions, Free radicals and Carbenes. **Stereochemistry:**

- Fischer Projection, Newman and Sawhorse Projection formulae and their interconversions; Geometrical isomerism: cis–trans and, syn-anti isomerism E/Z notations with C.I.P rules.
- *Optical Isomerism:* Optical Activity, Specific Rotation, Chirality/Asymmetry, Enantiomers, Molecules with two or more chiral-centres, Distereoisomers, meso structures, Racemic mixture and resolution. Relative and absolute configuration: D/L and R/S designations.

UNIT- II CHEMISTRY OF ALIPHATIC HYDROCARBONS

- **Carbon-Carbon sigma bonds**
  - Chemistry of alkanes: Formation of alkanes, Wurtz Reaction, Wurtz-Fittig Reactions, Corey-House Reaction, Free radical substitutions: Halogenation - relative reactivity and selectivity.
- **Carbon-Carbon pi bonds**
  - Formation of alkenes and alkynes by elimination reactions, Mechanism of E1, E2, E1cb reactions. Saytzeff and Hofmann eliminations.
  - *Reactions of alkenes:* Electrophilic additions their mechanisms (Markownikoff/ AntiMarkownikoff addition), mechanism of oxymercuration-demercuration, hydroboration-oxidation, ozonolysis, reduction (catalytic and chemical). Diels- Alder reaction; Allylic and benzylic bromination and mechanism, e.g., propene, 1- butene, toluene, ethyl benzene.
  - *Reactions of alkynes:* Acidity, Electrophilic and Nucleophilic additions. Hydration to form carbonyl compounds.

- **Cycloalkanes and Conformational Analysis**
  - Types of cycloalkanes and their relative stability, Baeyer strain theory, Conformation analysis of alkanes: Relative stability: Energy diagrams of cyclohexane: Chair, Boat and Twist boat forms; Relative stability with energy diagrams.

UNIT- III AROMATIC HYDROCARBONS

- *Aromaticity:* Hückel 's rule, aromatic character of arenes, cyclic carbocations/carbanions andheterocyclic compounds with suitable examples. Electrophilic aromatic substitution: halogenation, nitration, sulphonation and Friedel-Craft 's alkylation/acylation with their mechanism. Directing effects of the groups.

UNIT- IV CHEMISTRY OF HALOGENATED HYDROCARBONS:

- *Alkyl halides:* Methods of preparation, nucleophilic substitution reactions – S_N1, S_N2 and S_Ni mechanisms with stereochemical aspects and effect of solvent etc.; nucleophilic substitution vs. elimination.
- *Aryl halides:* Preparation, nucleophilic aromatic substitution; S*N*Ar, Benzyne mechanism. Relative reactivity of alkyl, allyl/benzyl, vinyl and aryl halides towards nucleophilic substitution reactions.

SUGGESTED READINGS

1. Morrison, R. N.; Boyd, R. N. *Organic Chemistry*, Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
2. Finar, I. L. *Organic Chemistry (Volume 1)*, Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
3. Finar, I. L. *Organic Chemistry (Volume 2: Stereochemistry and the Chemistry of Natural Products)*, Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
4. Eliel, E. L. & Wilen, S. H. *Stereochemistry of Organic Compounds*, Wiley: London, 1994.
5. Kalsi, P. S. *Stereochemistry Conformation and Mechanism*, New Age International, 2005.

CORE COURSE (CHEMISTRY)

COURSE NAME: ORGANIC CHEMISTRY-I PRACTICAL
COURSE CODE: EDU243

L	T	P	CR
0	0	3	2

INDIVIDUALIZED SESSIONAL WORK: It will include the following activities:

1. Checking the calibration of the thermometer
2. Purification of organic compounds by crystallization using the following solvents:
   a. Water
   b. Alcohol
   c. Alcohol-Water
3. Determination of the melting points of above compounds and unknown organic compounds (Kjeldahl method and electrically heated melting point apparatus)
4. Effect of impurities on the melting point – mixed melting point of two unknown organic compounds
5. Determination of boiling point of liquid compounds. (boiling point lower than and more than 100 °C by distillation and capillary method)
6. Detection of extra elements.
7. Functional group tests for alkenes, alcohols, phenols, carbonyl and carboxylic acid group.

CORE COURSE (BOTANY)

COURSE NAME: DIVERSITY OF SEED PLANTS AND THEIR SYSTEMATICS
COURSE CODE: EDU245

L	T	P	CR
4	0	0	4

UNIT-I

- General characteristics and economic importance of gymnosperms; differences between gymnosperms and angiosperms; differences between manoxylic and pycnoxylic wood.
- Fossil gymnosperms: Brief account of fossils, their formation and types (excluding details). Lyginopteris: Introduction, external structure of stem; internal structure of primary stem, root and leaf; reproduction.

UNIT-II

- Structure, reproduction (male and female strobilus; structure of ovule; development of male and female gametophytes; pollination, fertilization, development of embryo and structure of seed) and life cycle of *Cycas*

and *Pinus*.

UNIT-III

- General characters of Angiosperms. Plant nomenclature and International Code of Botanical Nomenclature: Common names and scientific names, principles and rules; taxonomic ranks; type concept (Holotype, Isotype, Syntype, Paratype, Lectotype, Neotype and Topotype); principle of priority, aims and objectives of plant taxonomy. A brief account of Bentham and Hooker 's System of classification, its merits and demerits.
- Terminology pertaining to floral description.

UNIT-IV

- General account and diagnostic features of the following families (excluding economic importance):
  - Gramineae (Poaceae): *Triticum*
  - Ranunculaceae: *Ranunculus* and *Delphinium*
  - Brassicaceae: *Brassica*
  - Rutaceae: Citrus and *Murraya*
  - Malvaceae: *Hibiscus*
  - Fabaceae: *Lathyrus*, *Cassia* and *Acacia*
  - Compositae (Asteraceae): *Helianthus*/*Ageratum*
  - Solanaceae: *Solanum*
  - Labiatae (Lamiaceae): *Ocimum*

SUGGESTED READINGS

1. Bhatnagar, S.P. and Moitra, A. Gymnosperms, New Age International Limited, New Delhi, 1996.
2. Chopra, G.L. Text book of Gymnosperms, S. Nagin, Delhi, 1976.
3. Pandey, B.P. College Botany, Vol. II., S. Chand & Company Ltd., New Delhi, 1994.
4. Singh, V., Pande, P.C. and Jain, D.K., A Text Book of Botany: Diversity and Systematics of Seed Plants, Rastogi Publications, Meerut, 2013.
5. Srivastava, H.N. Diversity of Seed Plants and their Systematics, Vol. III., Pradeep Publications, Jalandhar, 2014.
6. Stewart, W.M. Pale botany and the Evolution of Plants, Cambridge University Press, Cambridge, 1983.
7. Chopra, G.L. Angiosperms: Systematic and Life Cycle, Pradeep Publications, Jalandhar, 1987.
8. Davis, P.H. and Heywood, V.H. Principles of Angiosperm Taxonomy, Oliver and Boyd, London, 1963.
9. Naik, V.N. Taxonomy of Angiosperms, Tata McGraw Hill Education, 1984.
10. Singh, G. Plant Systematics: Theory and Practice, Oxford and IBH Pvt. Ltd., New Delhi, 1999.
11. Vasishta, P.C. Taxonomy of Angiosperms. R. Chand & Co., New Delhi, 1997.

CORE COURSE (BOTANY)

COURSE NAME: DIVERSITY OF SEED PLANTS AND THEIR SYSTEMATICS PRACTICAL

L	T	P	CR
0	0	3	2

COURSE CODE: EDU247

INDIVIDUALIZED SESSIONAL WORK: It will include the following activities:

1. Cycas:

a) Habit, armour of leaf bases on the stem, young and old foliage leaves, scale leaves, male cone, Megasporophyll, seed.

b) Preparation of permanent stained slides of Cycas (T.S. leaflet, rachis and coralloid root).

2. Pinus:

a) Dwarf shoot; Male cone; Female cones (first year, second year and third year); Seed.

b) Preparation of permanent slide of T.S. needle and pollen grains

c) Study through permanent slides: L.S. male cone; L.S. female cone; L.S. ovule

3. Description of flowers in technical terms, drawing Floral Diagram, V.S. flower, T.S. ovary, writing Floral Formula with reference to the respective families of the genera mentioned in different families in theory syllabus

CORE COURSE (ZOOLOGY)

COURSE NAME: BIOCHEMISTRY AND ANIMAL PHYSIOLOGY

COURSE CODE: EDU249

L	T	P	CR
4	0	0	4

UNIT- I

- Carbohydrates, proteins, lipids and nucleic acids: their classifications and functions.\
- Enzymes: Nature, their classification and coenzymes.
- Carbohydrate metabolism: The Embden Meyerhof, Parnas pathway, (glycolysis), the tricarboxylic acid cycle, the hexose monophosphate shunt, glycogenesis and glycogenolysis.
- Lipid Metabolism: β-oxidation of fatty acids, fate of glycerol and, ketosis. Protein Metabolism: Metabolism of amino acids (Oxidative deamination, transamination &decarboxylation) hydrolysis of protein and ornithine cycle

UNIT-II

- **Digestion**: Digestion of dietary constituents, regulation of digestive processes and absorption. Extra and intra cellular digestion, enzymatic digestion and symbiotic digestion.
- **Respiration:** Transport of O2 and CO2, Oxygen dissociation curve of hemoglobin, Bohr effect, chloride (-) shift, Haldane effect and control of breathing.

UNIT-III

- **Blood:** Composition and functions of blood and lymph. Function of hemoglobin, blood clotting. Blood groups including Rh. Factor.
- **Excretory system**: Histology of kidney, ureter and bladder; renal blood supply; Mechanism and regulation of urine formation; Regulation of acid-base balance; renal failure and dialysis.

UNIT-IV

- **Muscles:** Ultra structure, chemical and physiological basis of skeletal muscles contraction.
- **Neural Integration:** Structure of neuron, resting membrane potential, origin and propagation of impulse along the axon, synapse and myoneural junction.
- **Endocrine System:** Structure, hormones and functions of thyroid, parathyroid, adrenal, pineal, hypothalamus, pituitary, pancreas, gonads, thymus, hormones of alimentary canal and kidney.

SUGGESTED READINGS

1. Guyton, A.C., Hall, J.E. Text Book of Medical Physiology, XIIth edition, Harcourt Asia Pvt. Ltd. /W.B. Saunders Company, 2011.
2. Best, J.P., Best and Taylor ‘s physiological basis of medical practice, 11th ed., William and Wilkins, 1985.
3. Hoar, W.S., General and comparative physiology, Adaptation and Environment, 3rd, Cambridge University Press, 1983.
4. Rhoades, R.A., Tanner, G.A., Medical Physiology, 2nd ed., Lippincott Williams and Wilkins, 2003.
5. Tortora, G.J., Derrickson, B.H. Principles of Anatomy and Physiology, XII Edition, John Wiley and Sons, Inc., 2009.
6. Bhojwani, S.S. 1990: Plant Tissue Culture Applications and Limitations. Elsevier Science Publishers, New York, USA.
7. Lea, P.J. and Leegood, R.C. 1999: Plant Biochemistry and Molecular Biology, John Wiley & Sons, Chichester, England.
8. Old, R.W. and Primrose, S.B. 1989: Principles of Gene Manipulation, Blackwell Scientific Publications, Oxford, UK.
9. Raghavan, V. 1986: Embryogenesis in Angiosperms: A Developmental and Experimental Study, Cambridge University Press, New York, USA.
10. Taneja, S.K.: Biochemistry & Animal Physiology, TruemanBook Co.,1997.
11. 3. Robert, K., Murray, R.K., Harper ‘s Biochemistry, 22nd edition,
12. Daryl, M., Granner, K., Prentice – Hall International, Inc., 1990Victor, W. and Woodwell.
13. Nelson, D.L. and Cox, M.M.: Lehninger Principles of Biochemistry, 5th edition,
14. W.H., Freeman and Company, New York, 2008
15. Guyton, A.C. & Hall, J.E. (2006). Textbook of Medical Physiology. XI Edition. Hercourt Asia PTE Ltd. /W.B. Saunders Company.
16. Tortora, G.J. & Grabowski, S. (2006). Principles of Anatomy & Physiology. XI Edition John Wiley & sons, Inc.
17. Victor P. Eroschenko. (2008). DiFiore’s Atlas of Histology with Functional Correlations. XII Edition. Lippincott W. & Wilkins.
18. Arey, L.B. (1974). Human Histology. IV Edition. W.B. Saunders.

CORE COURSE (ZOOLOGY)

L	T	P	CR
0	0	3	2

COURSE NAME: BIOCHEMISTRY AND ANIMAL PHYSIOLOGY PRACTICAL

COURSE CODE: EDU251

INDIVIDUALIZED SESSIONAL WORK: It will include the following activities:

Biochemistry and Animal Physiology

- Identification of food stuffs-starch, sucrose, glucose, proteins and fats.
- Demonstration of osmosis and diffusion.
- Demonstration of the presence of amylase enzyme in saliva. Effect of pH and Temperature on enzyme action.
- Determination of coagulation and bleeding time of blood.
- Determination of blood groups of human blood samples.
- Recording of blood pressure of man.
- Enumeration of red blood corpuscles and white blood corpuscles of man.
- Estimation of haemoglobin content in blood.
- Analysis of urine for urea, chloride, glucose and uric acid.
- An idea of location of endocrine glands in mammals through charts / models/ video clippings

Field study: Visit to a fossil Park/Museum. Familiarity with the local vertebrate fauna and report

Note: The above-mentioned practical are in accordance with the guidelines of UGC. Practical involving animal material will be conducted using models/charts/e-resources. Minor modifications in the curriculum are allowed subject to the availability of resources.

CORE COURSE (PHYSICS)

L	T	P	CR
4	0	0	4

COURSE NAME: DIGITAL SYSTEMS AND APPLICATION

COURSE CODE: EDU253

UNIT- I

- **Introduction to CRO:** Block Diagram of CRO, Electron Gun, Deflection System and Time

Base, Deflection Sensitivity, Applications of CRO: (1) Study of Waveform, (2) Measurementof Voltage, Current, Frequency, and Phase Difference.

- **Integrated Circuits (Qualitative treatment only):** Active & Passive components, Discrete
- Components, Wafer, Chip, Advantages and drawbacks of ICs, Scale of integration: SSI, MSI, LSI and VLSI (basic idea and definitions only), Classification of ICs, Examples of Linear and Digital lCs.

UNIT- II

- **Digital Circuits and Boolean algebra:** Difference between Analog and Digital Circuits. Binary Numbers, Decimal to Binary and Binary to Decimal Conversion, BCD, Octal and Hexadecimal numbers; AND, OR and NOT Gates (realization using Diodes and Transistor); NAND and NOR Gates as Universal Gates; XOR and XNOR Gates and application as Parity Checkers; De Morgan's Theorems; Boolean Laws; Simplification of Logic Circuit using Boolean Algebra; Fundamental Products, Conversion of a Truth table into Equivalent Logic Circuit by (1) Sum of Products Method and (2) Karnaugh Map.
- **Data processing circuits:** Basic idea of Multiplexers, De-multiplexers, Decoders, Encoders.

UNIT- III

- **Arithmetic and Sequential Circuits:** Binary Addition. Binary Subtraction using 2'sComplement; Half and Full Adders, Half & Full Subtractors, 4-bit binary Adder/Subtractor;
- SR, D, and JK Flip-Flops; Clocked (Level and Edge Triggered) Flip-Flops, Preset and Clear
- Operations, Race-around conditions in JK Flip-Flop, M/S JK Flip-Flop.
- **Shift registers:** Serial-in-Serial-out, Serial-in-Parallel-out, Parallel-in-Serial-out and Parallel in-Parallel-out
- Shift Registers (only up to 4 bits). **Counters (4 bits):** Ring Counter, Asynchronous counters, Decade Counter. Synchronous Counter.

UNIT- IV

- **Computer Organization:** Input/output Devices; Data storage (idea of RAM and ROM);
- Computer memory, Memory organization & addressing; Memory Interfacing; Memory Map;
- **Intel 8085 Microprocessor Architecture:** Main features of 8085. Block diagram.

SUGGESTED READINGS

1. A. P. Malvino, and D. P. Leach, Digital Principles and Applications. New Delhi: TataMcGraw Hill, 1986.

2. A. P. Malvino, Digital Computer Electronics. New Delhi: Tata McGraw Hill, 1986.
3. W. H. Gothmann, Digital Electronics. New Delhi: Prentice Hall, 1980.
4. J. Millman, and H. Taub, Pulse, Digital and Switching Waveforms. New Delhi: TataMcGraw Hill, 1992.
5. A. Mottershead, Electronic Devices and Circuits. New Delhi: Prentice Hall, 1977.
6. R. S. Gaonkar, Microprocessor Architecture, Programming and Applications with 8085. New Delhi: Prentice Hall, 2002.

L	T	P	CR
0	0	4	2

CORE COURSE (PHYSICS)

COURSE NAME: DIGITAL SYSTEMS AND APPLICATION PRACTICAL
COURSE CODE: EDU255

INDIVIDUALIZED SESSIONAL WORK: It will include the following activities:

1. To measure (a) Voltage, and (b) Time period of a periodic waveform using CRO.
2. To test a Diode and Transistor using a Multimeter.
3. To design a switch (NOT gate) using a transistor.
4. To verify and design AND, OR, NOT and XOR gates using NAND gates.
5. To design a combinational logic system for a specified Truth Table.
6. To convert a Boolean expression into logic circuit and design it using logic gate ICs.
7. To minimize a given logic circuit.
8. Half Adder, Full Adder and 4-bit binary Adder.
9. Half Subtractor, Full Subtractor, Adder-Subtractor using Full Adder I.C.
10. Parity generator and checker.
11. To study D/A and A/D convertor.
12. To build Flip-flop Circuits using elementary gates (RS, Clocked RS, D type, and JK Flip Flop).
13. To build Flip-Flop (RS, Clocked RS, D-type and JK) circuits using NAND gates.
14. To build JK Master-slave flip-flop using Flip-Flop ICs

FIELD ENGAGEMENT/ INTERNSHIP/ DEVELOPING CRITICAL SKILLS

COURSE NAME: RECORDING BEST PRACTICES IN DIFFERENT SCHOOLS
COURSE CODE: EDU291

L	T	P	CR
0	0	1	1

Duration: 1 Week

Note: The future of our communities depends on a generation, not only skilled in academics, but also excited about belonging to an educated community. Thatcommunity will arise only if schools engage and connect with today 's children. Effective schools create an environment that increases academic, social and emotional success- an environment of strong school connectedness.

Best practices are an inherent part of a curriculum that exemplifies the connection and relevance identified in educational research. They interject rigor into the curriculum by developing thinking and problem-solving skills through integration and active learning. Relationships are built through opportunities for communication and teamwork. Best practices are applicable to all grade levels and provide the building blocks for instruction. Best practices motivate, engage and prompt students to learn and achieve. Students who receive a balanced curriculum and possess the knowledge, skills and abilities to transfer and connect ideas and concepts across disciplines will be successful as measured by standardized tests and other indicators of student success. Both scholastic and co- scholastic areas are covered under best practices.

Four best practices for teachers include:

- Teaching a balanced curriculum,
- Teaching an integrated curriculum,
- Differentiating instruction to meet individual student needs and
- Providing active learning opportunities for students to internalize learning.

Each pupil teacher will prepare a report and will submit it to the concerned teacher. This report will be evaluated and grades will be awarded.

Semester- IV

COURSE	COMPONENT	NATURE	COURSE CODE	COURSE NAME	DISTRIBUTION OF HOURS			TOTAL CREDITS
					LECTURE	TUTORIAL	PRACTICAL	
1.	Perspectives in Education	Compulsory	EDU202	Learning and Teaching	6	0	0	6
2.	Skill Enhancement course/Enhancing Professional Capacities	Compulsory	EDU232	Drama and Art in Education	0	0	3	2
3.	Skill Enhancement course/Enhancing Professional Capacities	Compulsory	EDU234	Reading and Reflecting on Text	2	0	0	2
4.	Core Course	Compulsory	EDU214/ EDU250	Mathematics/ Zoology	6/4	0	0	6/4
5.	Core Course	Compulsory	EDU242	Chemistry	4	0	0	4
6.	Core Course	Compulsory	EDU244	Chemistry Practical	0	0	3	2
7.	Core Course	Compulsory	EDU246/ EDU254	Botany/Physics	4	0	0	4
8.	Core Course	Compulsory	EDU248 EDU256	Botany Practical/Physics Practical	0	0	3	2
9.	Core Course	Compulsory	EDU252	Zoology Practical	0	0	3	2
10.	Curriculum and Pedagogic studies	Compulsory	EDU272	Language Across the Curriculum	2	0	0	2
11.	Curriculum and Pedagogic studies	Compulsory	EDU274	Assessment for Learning	2	0	0	2
12.	Field Engagement/ Internship/ Developing Critical Skills	Compulsory	EDU292	Preparing School Map	0	0	1 Week	1
GRAND TOTAL								33

PERSPECTIVES IN EDUCATION

L	T	P	CR
6	0	0	6

COURSE NAME: LEARNING AND TEACHING

COURSE CODE: EDU202

OBJECTIVES: To enable the student teacher to:

- Develop scientific attitude for the process of teaching and learning.
- Understand the concept, nature, theories and factors effecting learning.
- Explore psycho- social domains of teaching and learning.
- Understand overall view of teaching and learning styles.
- Conceptualize the needs of exceptional/ gifted children.
- Administer, score and interpret the results of psychological tests.

COURSE CONTENT UNIT-I

- **Learning:** Meaning, Nature, Theories and Factors effecting learning and their educational implications.
- Learner's motivation
- Constructivism–implications to curriculum and pedagogy, Characteristics of constructivist classroom and constructivist teacher.

UNIT-II

- Psychosocial domains of Teaching and Learning according to Erikson's Theory
- Cognitive Psychology: - Meaning, Importance in Learning & Teaching. Cognitive development according to Piaget.
- Socio- cultural theory: – Meaning, Importance in teaching and learning, Socio-cultural theory according to Vygotsky (ZPDconcept).
- Emotional development: - Meaning, Process, and its effect on Teaching and Learning Process.

UNIT-III

- Learning and teaching style: Learning Style: -Concept, Types and importance in Teaching-Learning process, factors effecting learning styles.
- Teaching Style: -Concept, Types and effect on Teaching-Learning process, factors effecting teaching styles.
- Role of Cerebral Hemispheres in Thinking, learning and Teaching Style.

UNIT-IV

MODELS OF TEACHINGEffective teaching: meaning, component and parameters of effective teaching, identification of teaching skills, principles of teaching

- Concept Attainment Model
- Advance Organiser Model

INDIVIDUALIZED SESSIONAL WORK: It will include the following activities:

1. Serial learning of meaningful and nonsense syllables, Memory test, Case study, Division of attention test, Personality test, Verbal test of Intelligence, Non-verbal test of Intelligence, Emotional Intelligence test, Mental Health assessment tool, Measurement of Study Habits.
2. Visit to 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 learning and teaching which you observed there.
3. Observe a class in your practicing 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.
4. The class will be divided into groups constituting of 5 to 6 students and each team will be given an assignment for power-point presentation.
5. The class will be covered through the project work e.g., Teaching learning process in some classrooms for few days.
6. Prepare concept maps on pedagogy subject, teach in school and write a reflective note on how it helps learner.
7. Read few diaries written by teachers; analyze their text in the context of teaching activities.
8. Interact with your peers and few teachers. Discuss whether teaching is a profession and prepare a report on the basis of their perception.
9. Interact with few teachers in a nearby school and discuss with them the relevance of training they received with respect to the classroom teaching.

TRANSACTIONAL MODALITIES

Communicative/Interactive and Constructivist approaches, imparting knowledge by means of creating situations. Teaching and learning of the course will be through a student-centred approach. Different interactive strategies, such as group discussions, presentations, and assignments will be applied to promote creativity. Independent learning will also be encouraged through cl ass assignments. The course readings will be provided to students at the start of the course to inculcate the habit of reading. This will also help to raise the level of in-class discussion and make the course more dynamic.

SUGGESTED READINGS

1. Aggarwal J. C., Essentials of Educational Psychology, Vikas Publishing House Pvt. Ltd.2010.
2. Bhatia & Bhatia, A Text Book of Educational Psychology, Doaba House, New Delhi2001.
3. Charles E. Skinner, Educational Psychology, Prentice Hall of India Pvt.Ltd. New Delhi1996.
4. Clifford T. Morgon, A Brief Introduction to Educational Psychology, Tata- McGraw HillPub. Com. Ltd. New Delhi2000.
5. Dandekar W. N, Psychological Foundations of Education, Macmillan India Pvt. Ltd.2000.
6. Dandapani S, A Text Book of Advanced Educational Psychology, Anmol PublicationsPvt. Ltd. NewDelhi,2000.
7. Elizabeth Hurlock. Personality & development, Tata- McGraw Hill Pub. Com. Ltd. New Delhi 2000.
8. Hilgard E. R, Atkinson R C & Atkinson R L Introduction to Psychology, Oxford & IBH Pub. Com. Ltd. New Delhi1980.
9. Henry Garrett, Great experiments in Psychology, Appleton- Century- crofts, INC, NewYork.
10. Kavya Kishore., P.B. Fundamentals of Educational Psychology: Learning and Instruction, Anmol publications Pvt (Ltd), New Delhi,2013.
11. Paul. R. Abramson, Personality, Holt Rinehart & Winston, New York,1960.
12. Prof. E.G. Parameswaran, C. Beena.An Invitation to Psychology Neel Kamal Publications Pvt. Ltd., NewDelhi-2004.
13. Shrivashra D.N, Verma Preeti 2007, Child Psychology: Child Development Vinod Pustak Mandir, Agra.
14. Pareek Prof Matworeshwar, Child Development and Family Relationship, Research Publication, Jaipur,2002.
15. Mangal. S.K, MangalShubhra, Child Development, Arya Book Depot New Delhi,2005.
16. Sharma, R.K, Sharma, H.S, Tiwari, Aryana, Psychological Foundation of Child development, Rodha Prakashan Mandir, Agra,2006.
17. Singh. D.P, talang. Amritanshy, prakashved. Psycho- social basis of learning and development, research publication, Jaipur,2002.
18. Shrivasha. D.N. Verma, Verma, Preeti, Modern Experimental Psychology and Teshing, Shri Vinod PustakHandir, Agra,2010.
19. Mathur, S.S., Development of learner and Teaching learning process, Agrawal publication, Agra,2007-08.
20. Mishra. R.c., Child Psychoplogy. A.P.H Publishing Corporation, New Delhi,2010.
21. Dweck, C. Mindset: The new psychology of success. Random House LLC,2006.

22. Piaget, J. Development and learning. in M Gauvarin& M. Cole (Eds.) readings on the development of children. New York. WH freeman & company,1997.
23. Plato, R e a s o n and persuasion Three dialogues in J. Holbo (Ed) meno: reason, persuasion and virtue. Person, 2009.
24. Saraswathi T. S. Adult-child continuity in India: in adolescence a myth or an emerging reality? In Saraswathi T.S. {9Ed} culture, socialization and human development: theory research and applications in India. New Delhi Sage,1999.
25. Mangal S.K, Advanced Educational Psychology P H I Learning Pvt. Ltd. NewDelhi-2008.

CORE COURSE (MATHEMATICS)

L	T	P	CR
6	0	0	6

COURSE NAME: DIFFERENTIAL EQUATIONS, VECTOR CALCULUS AND MECHANICS

COURSE CODE: EDU214

OBJECTIVES: After the completion of the semester, the students will be able to:

- Derive theorems related to differentiation and integration of transforms.
- Solve partial differential equations with general and charpits method.
- Derive vector transformation, vector integration and related problems.
- Explain velocities and accelerations in its varieties as prescribed in the courses.
- Derive motions on different places and different media.

COURSE CONTENT UNIT- I

- Differentiation and integration of transforms, Convolution theorem, solution of integral equations and systems of differential equations using the Laplace transformations.

UNIT- II

- Partial differential equations of the first order, Lagrange's solution, some special types of equations which can be solved easily by methods other than the general method. Charpit 's general method of solution

UNIT- III

- Preliminary concepts, Force Sysytems-coplanner, collinear, concurrent, parallel, equivalent force systems; Forces acting at a

point-parallelogram law of forces, resolved parts of a force, triangle law of forces, $\lambda - \mu$ theorem, Lami's theorem, polygon law of forces, Parallel forces-two like parallel, unlike parallel; Moments –moment of force, Varigon's theorem

UNIT- IV

- Dynamics-state of rest and motion, displacement, velocity, speed, acceleration; motion with constant acceleration; Newton's laws

of motion, weight carried by a lift, Atwood's machine, motion on a smooth inclined plane; constrained motion along a smooth inclined plane; motion under variable acceleration.

SUGGESTED READINGS

1. Ayres, F. (1972). Theory and Problems of Differential Equations. McGraw-Hill Book Company.
2. Bronson, R. (1973). Theory and Problems of Differential Equations. McGraw-Hill Book Company.
3. Erwin, K. (1999). Advanced Engineering Mathematics. John Wiley &. Sons Inc., New York.
4. Forsyth, A.R. (1998). A Treatise on Differential Equations. Macmillan and Co. Ltd., London.
5. Hilderbrand, F.B. (1977), Advanced Calculus or Applications. Prentice Hall of India Pvt. Ltd., New Delhi.
6. Loney, S.L. (1956). An Elementary Treatise on the Dynamics of a Particle and of Rigid' Bodies. Cambridge University Press.
7. Loney, S.L. (1978). Statics. Macmillan and Company, London.
8. Murrary R.S. (1997). Vector Analysis. Schaum Publishing Company, New York.
9. Murray, D.A. (1967). Introductory Course on Differential Equations. Onent Longman, India.
10. Narayan, S. (1993). A Text Book of Vector Calculus. S. Chand & Co., New Delhi.
11. Saram, N. &Nigam, S.N. (1989). Introduction to Vector Analysis. Pothishala Pvt. Ltd., Allahabad.
12. Sneddon, I.N. (1988). Elements of Partial Differential Equations. McGraw-Hill Book Company.
13. Verma, R.S. (1988). A Text Book on Statics. Pothishala Pvt. Ltd., Allahabad.

SKILL ENHANCEMENT COURSE

L	T	P	CR
0	0	3	2

COURSE NAME: DRAMA AND ART IN EDUCATION
COURSE CODE: EDU232

OBJECTIVES: The student teacher will able to understand the

- Different Art forms – impact of Art forms on the human mind
- How to enhance artistic and aesthetic sensibility of learners to enable them to respond to the beauty in different Art forms, through genuine exploration, experience and free, expression
- Use of different skills for integrating different Art forms across school curriculum at secondary level
- The way to create awareness of the rich cultural heritage, artists and artisans

COURSE CONTENT

UNIT- I VISUAL ARTS AND CRAFTS

- Experimentation with different materials of Visual Art, such as pastel, poster, pen and Ink, Rangoli materials, clay, etc.
- Exploration and experimentation with different methods of Visual Arts like Painting,
- Block printing, collage, clay modelling, paper cutting and folding, etc.
- Paper framing and display of Art works.

UNIT- II PERFORMING ARTS: DANCE, MUSIC, THEATRE AND PUPPETRY

- Listening/viewing and exploring Regional Art forms of Music, Dance, Theatre and Puppetry.
- Participation and performance in any one of the Regional Arts forms keeping in mind the integrated approach

UNIT- III APPRECIATION OF ARTS

- Instruments, Theatre, Puppetry (based on a set of slides, videos, documentaries selected for the purpose)
- Knowledge of Indian Craft Traditions and its relevance in education (based on a set of slides, Videos Films, Documentaries selected for the purpose)
- Knowledge of Indian Contemporary Arts and Artists; Visual Arts based on the videos, Films and Documentaries selected for the purpose
- Indian festivals and its Artistic significance.

UNIT- IV ENGAGEMENT IN ANALYSIS AND ACTIVITIES

- Initiation into the craft of Drama and related activities for engagement in schools with learners
- Theme-based projects from any one of the curricular areas covering its social, economic, cultural and scientific aspects integrating various Arts and Craft forms.
- Textbook analysis to find scope to integrate Art forms either in the text or activities or exercises; Documentation of the processes of any one Art or Craft form with the pedagogical basis such as weaving or printing of textiles, making of musical instruments, folk performances in the community, etc. How does the artist design their products, manage their resources, including raw materials, its marketing, problems they face, to make them aware of these aspects of historical, social, economic, scientific and environmental concerns?

INDIVIDUALIZED SESSIONAL WORK: It will include the following activities:

1. Two workshops of half a day each, of one week duration for working with artists/artisans to learn basics of Arts and Crafts and understand its pedagogical significance.
2. The Arts forms learnt during the course should be relevant to the student-teachers in their profession.
3. Activities, such as drawing, posters and painting, rangoli, clay modelling, pottery, mixed collage, woodcraft, theatre, puppetry, dance, music, etc. region specific should be given more importance for making arts learner-centred.
4. The focus of the workshops should be on how art forms can be used as tool/method of teaching-learning of Languages, Social Sciences, Mathematics and Sciences

TRANSACTIONAL MODALITIES

Communicative/Interactive and Constructivist approaches, imparting knowledge by means of creating situations. Teaching and learning of the course will be through a student-centred approach. Different interactive strategies, such as group discussions, presentations, and assignments will be applied to promote creativity. Independent learning will also be encouraged through cl ass assignments. The course readings will be provided to students at the start of the course to inculcate the habit of reading. This will also help to raise the level of in-class discussion and make the course more dynamic.

SUGGESTED READINGS

1. Position Paper- National Focus Group on Arts, Music, Dance and Theatre NCERT, 2006, NewDelhi
2. Position Paper- National Focus Group on Heritage Crafts, NCERT, New Delhi, 2006 3. NCF2005
4. NROER- National Repository of Open Educational Resource, Department of School Education &Literacy, MHRD.
5. Living Craft tradition of India (Textbook in Heritage Crafts) NCERT
6. Exploring the Craft Tradition of IndiaNCERT
7. Bhartiya Hastakalaki Paramparayen, NCERT
8. An Introduction to Indian Art, NCERT
9. Bhartiya Hastkala Parampara Ki Khoj, NCERT
10. Craft Tradition of India (Textbook in Heritage craft for classXII)
11. Art Education- Teachers 'Handbook for Class I, II, III, IV, V, VI, VII, VIII, IX
12. Source Book on Assessment for Classes I- V, Art Education

SKILL ENHANCEMENT COURSE

L	T	P	CR
2	0	0	2

COURSE NAME: READING AND REFLECTING ON TEXTS

COURSE CODE: EDU234

OBJECTIVES: To enable the student teachers to:

- Develop proficiency in reading and responding to written texts.
- Examine and appreciate authentic literary and non-literary texts.
- Develop study and reference skills
- Reflect on the ideas expressed in the texts.
- Plan, draft, edit and present a piece of writing related to their understanding of a text.

UNIT-I

- **Stories and excerpts from narratives (any one or more)**
  - *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- Penguin UK-2006
  - *Encounters with Animals*- Gerald Durrel-Penguin-2012

UNIT- II

- **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-III

- **Essays /Excerpts from literary texts (any one or two)**
  - *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.
  - *Running in the Family*- Michael Ontage, Bloomsbury, London.
  - *Interpreter of Maladies*- (Title Story)-JhumpaLahari, Mariner Books.

UNIT- IV

- **Essays/Excerpts from Educational and Scientific Texts (Choose any three)**
  - *Medium of education* (The selected works of Gandhi- Vol.6), Nava Jeevan Publication.
  - *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*
  - *Civilization and progress. In Crisis in civilization and other essays. (Tagore, R.) Rupa & Co.*
  - *RTE Act, 2009*

TRANSACTIONAL MODALITIES

Communicative/Interactive and Constructivist approaches, imparting knowledge by means of creating situations. Teaching and learning of the course will be through a student-centred approach. Different interactive strategies, such as group discussions, presentations, and assignments will be applied to promote creativity. Independent learning will also be encouraged through cl ass assignments. The course readings will be provided to students at the start of the course to inculcate the habit of reading. This will also help to raise the level of in-class discussion and make the course more dynamic.

CORE COURSE
(CHEMISTRY)

L	T	P	CR
4	0	0	4

COURSE NAME: INORGANIC CHEMISTRY- II
COURSE CODE: EDU242

OBJECTIVES: This course is intended to learn the basic concepts of Inorganic Chemistry. The various topics of the syllabus are grouped under different units in order to bring forth importance of academic and laboratory skills for the undergraduate students.

COURSE CONTENT UNIT- I

- **Coordination Chemistry:** Werner 's theory, valence bond theory (inner and outer orbital complexes), electroneutrality principle and back bonding. Crystal field theory, measurement of CFSE10Dq in weak and strong fields, pairingo, t). energies, factors affecting the magnitude of 10 Dq (Octahedral vs. tetrahedral coordination,
- IUPAC nomenclature of coordination compounds, isomerism in coordination compounds. Stereochemistry of complexes with 4 and 6 coordination numbers. Chelate effect, polynuclear complexes, Labile and inert complexes.
- **Reaction Kinetics and Mechanism**: Introduction to inorganic reaction mechanisms. Substitution reactions in square planar complexes, Trans- effect, theories of trans effect, Mechanism of nucleophilic substitution in square planar complexes.

UNIT- II

- **Transition Elements:** General group trends with special reference to electronic configuration, colour, variable valency, magnetic and catalytic properties, ability to form complexes. Difference between the first, second and third transition series. Chemistry of Fe and Co in various oxidation states (excluding their metallurgy)
- **Lanthanides and Actinides:** Electronic configuration, oxidation states, colour, spectral and magnetic properties, lanthanide contraction.

UNIT- III

- **Organometallic Compounds:** Definition and classification of organometallic compounds on the basis of bond type. Concept of hapticity of organic ligands.
- Metal carbonyls: 18 electron rule, electron count of mononuclear, polynuclear and substituted metal carbonyls of 3d series. General methods of preparation (direct combination, reductive carbonylation, thermal and photochemical decomposition) of mono and binuclear carbonyls of 3d series.
- Zeise 's salt: Preparation and structure, evidences of synergic effect and comparison of synergic effect with that in carbonyls.
- Ferrocene: Preparation and reactions (acetylation, alkylation, metallation, Mannich Condensation). Structure and aromaticity
- **Catalysis by Organometallic Compounds:** Study of the following industrial processes and their mechanism: Alkene hydrogenation (Wilkinsons Catalyst), Wacker Process.

UNIT- IV

- **Bioinorganic Chemistry:** Metal ions present in biological systems, classification of elements according to their action in biological system. Geochemical effect on the distribution of metals. Excess and deficiency of some trace metals. Toxicity of metal ions (Hg, Pb, Cd and as), reasons for toxicity.

SUGGESTED READINGS

1. Purcell, K.F &Kotz, J.C. *Inorganic Chemistry* W.B. Saunders Co, 1977.
2. Huheey, J.E., *Inorganic Chemistry*, Prentice Hall, 1993.
3. Lippard, S.J. & Berg, J.M. *Principles of Bioinorganic Chemistry*, Panima Publishing Company 1994.
4. Cotton, F.A. & Wilkinson, G, *Advanced Inorganic Chemistry*. Wiley-VCH, 1999
5. Basolo, F, and Pearson, R.C., *Mechanisms of Inorganic Chemistry*, John Wiley & Sons, NY, 1967.
6. Greenwood, N.N. &Earnshaw A., *Chemistry of the Elements*, Butterworth-Heinemann,1997.
7. Vogel, A.I. *A Textbook of Quantitative Inorganic Analysis*, ELBS. 1978

CORE COURSE (CHEMISTRY)

L	T	P	CR
0	0	3	2

COURSE NAME: INORGANIC CHEMISTRY- II PRACTICAL
COURSE CODE: EDU244
THE INDIVIDUALISED SESSIONAL WORK: It will include following activities:

(A) Iodo / Iodimetric Titrations

1. Estimation of Cu (II) and $K_2Cr_2O_7$ using sodium thiosulphate solution (Iodimetrically).
2. Estimation of (i) arsenite and (ii) antimony in tartar-emetic iodimetrically
3. Estimation of available chlorine in bleaching powder iodometrically.

(B) Inorganic preparations

1. Cuprous Chloride, Cu_2Cl_2
2. Preparation of Manganese (III) phosphate, $MnPO_4.H_2O$
3. Preparation of Aluminium potassium sulphate $KAl(SO_4)_2.12H_2O$ (Potash alum) or Chrome alum.

(C) Gravimetric Analysis

1. Estimation of nickel (II) using Dimethylglyoxime (DMG).
2. Estimation of iron as Fe_2O_3 by precipitating iron as $Fe(OH)_3$.

CORE COURSE (BOTANY)

L	T	P	CR
4	0	0	4

COURSE NAME: STRUCTURE, DEVELOPMENT AND REPRODUCTION IN FLOWERING PLANTS
COURSE CODE: EDU246
COURSE CONTENT

UNIT-I

- The basic body plan of a flowering plant. Diversity in plant form in annuals, biennials and perennials. Root system: Tap root and adventitious root system and their various types; structural and anatomical modifications.
- **Stem**: Modifications of aerial and underground stem.
- **Leaf**: Venation, phyllotaxy, simple and compound leaves, functions and modifications; internal structure (dicot and monocot leaves).

UNIT-II

- **Tissue systems**: Meristematic, shoot apex, root apex; simple and complex permanent tissues, special tissues; internal structure of primary dicot stem & root (*Helianthus*); secondary growth in dicot stem & root (*Helianthus*); internal structure of monocot stem & root (*Zea mays*); differences between dicot stem and monocot stem; differences between dicot root and monocot root.

UNIT-III

- **Flower**: As a modified shoot, functions; structure of anther and pistil; structure and development of male and female gametophytes.
- Types of pollination, advantages and disadvantages of self and cross-pollination; contrivances for self and cross-pollination, types of cross-pollination, characters of flowers pollinated by different agencies.

UNIT-IV

- Double fertilization and its significance; different types of ovules and embryo-sacs.
- **Seed formation**: Development of endosperm and embryo. Fruit development and parthenocarpy. Significance of seed: ecological adaptation and dispersal strategies.

SUGGESTED READINGS

1. Bhojwani, S.S. and Bhatnagar, S.P., The Embryology of Angiosperms, 5th edition. Vikas Publishing House Pvt. Ltd., Delhi, 2009.
2. Pandey, S.N., Chadha, A., Plant Anatomy and Embryology, Vikas Publishing House Pvt. Ltd., Delhi, 1996.
3. Rudall, P.J., Anatomy of Flowering Plants - An Introduction to Structure and Development, Cambridge University Press, USA, 2007
4. Singh, V., Plant Anatomy and Embryology of Angiosperms, Global Media Publications, Delhi 2010.
5. Singh, V., Pande, P.C. and Jain, D.K., A Text Book of Botany: Structure Development and Reproduction in Angiosperms, Rastogi Publications, Meerut, 2013.
6. Srivastava, H.N. Structure, Development and Reproduction in Flowering Plants, Vol. IV. Pradeep Publications,

Jalandhar, 2014.
7. Cutter, E.G. Part. I. Cells and Tissues, Edward Arnold, London, 1969.
8. Esau, K. Anatomy of Seed Plants, 2nd edition, John Wiley & Sons, New York, 1977.
9. Proctor, M. and Yeo, P., The Pollination of Flowers, William Collins Sons, London, 1973.
10. Vasishta, P.C. A Text book of Plant Anatomy, S. Nagin& Co., Delhi, 1979.

L	T	P	CR
0	0	3	2

CORE COURSE (BOTANY)

COURSE NAME: STRUCTURE, DEVELOPMENT AND REPRODUCTION IN FLOWERING PLANTS PRACTICAL

COURSE CODE: EDU248

THE INDIVIDUALIZED SESSIONAL: It work will include practical's:

1. Modifications of underground stem and leaf modifications
2. Study through permanent slides:
   i. V.S. dicot leaf
   ii. V.S. monocot leaf
3. T.S. dicot stem & root (Helianthus)
4. T.S. monocot stem & root (Zea maize)
5. Sectioning to differentiate between monocot and dicot roots.

Note: To make the students familiar with plants, (preferably pertaining to syllabus) the teachers are required to organize excursions to forests and hills.

CORE COURSE (ZOOLOGY)

COURSE NAME: ECOLOGY AND APPLIED ZOOLOGY
COURSE CODE: EDU250

L	T	P	CR
4	0	0	4

COURSE CONTENT UNIT- I

- **Basic concepts of ecology:** Definition, significance. Concepts of habitat and ecological niche.
- **Factors affecting environment:** Abiotic factors (light-intensity, quality and duration), temperature, humidity, topography; edaphic factors; biotic factors.
- **Pollution** – Definition and types (air, water, soil, pesticide, noise and thermal pollutions); causes, types of pollutants, sources, effects and control measures for air, water and soil pollutions.

UNIT- II

- **Ecosystem and Community:** Definition, Types and examples of ecosystem- terrestrial (grassland) and aquatic (pond). Concept, components, properties and functions; Ecological energetic and energy flow-food chain, food web, trophic structure; ecological pyramids concept of productivity,
- **Biogeochemical cycles:** Concept, reservoir pool, gaseous cycles and sedimentary cycles.

UNIT- III

- **Population:** Growth and regulation.
- **Environmental conservation**: Natural resources and conservation - mineral and energy resources and conservation; soil and conservation; environmental crisis; biodiversity and its importance; wildlife of India and conservation; Application of the study of ecology in wild life conservation and sustainable development.

UNIT- IV

- **Beneficial animals**: Basic principles of practices in culturing; Sericulture, Apiculture, Aquaculture. lac culture, edible and pearl oyster
- **Harmful animals**: Pests -morphology, life cycle, damages caused and control measures of common insect pests of stored food grains and crops, nematode pests of crops, insect vectors (each two); Control – biological control and integrated pest management (IPM)

SUGGESTED READINGS

1. Kreb, J.C. *Ecology.* New York: Harper & Row, Publ., 2009.
2. Odum, E.P. *Fundamentals of Ecology*. Indian Edition. Thomson Brooks/Cole, 2008.
3. Clarke, G. L. *Elements of Ecology*. New York: John Wiley & Sons, 1954.
4. Kendeigh, S.C. *Ecology with special reference to animals and man*. New Delhi: Prentice Hall of India, 1961.
5. Smith. *Ecology.* New York: Harper & Row Publishers, 1990.
6. Kormondy, E.J. *Concepts of Ecology*. 2nd ed. New Delhi: Prentice Hall of India, 2005.
7. Campbell, N.A. and Reece J.B. *Biology.* IX Edition. Pearson, Benjamin, Cummings, 2011.
8. Douglas, J. Futuyma. *Evolutionary Biology.*Sinauer Associates, 1997.
9. Hall, B.K. and Hallgrimson, B. *Evolution* IV Edition. Jones and Barlett Publishers, 2008.
10. Strickberger, M.W. *Genetics*. 3rd Edition. Prentice-Hall, India. 2008. Print.
11. Jones, S. *The Language of the Genes*. HarperCollins Publishers. 2012. Print.
12. Ridley, M. *Nature via Nurture: Genes, Experience, & What Makes Us Human*. HarperCollins Publishers. 2004. Print.
13. Aggarwal, V.K. and Verma, V.S. *Genetics.* 9th Edition. S. Chand, India. 2010. Print.
14. Snustad, D.P. and Simmons, M.J. *Principles of Genetics*. 6th Edition. John Wiley & Sons. 2011. Print.
15. Pierce, B.A. *Genetics: A Conceptual Approach.* 4th Edition. W.H. Freeman & Company 2010. Print
16. Fundamentals of Ecology by E.P. Odum – W.B. Saunders, Philadelphia).
17. Environmental Studies by S.V.S. Rana – (Rastogi Publications, 2008).
18. Animal Ecology by S.P. Singh, 6th Revised Edition – (Rastogi Publications, 2008).
19. Basic Ecology by E.P Odum (Holt, Rinehart & Winston, New York).
20. Ecology by S.K. Charles – (Prentice Hall of India, New Delhi)

21. Genetics by Stricksberger – (MacMillan).
22. Principles of Genetics by Sinnott, Dunn and Dobzhansky – (McGraw Hill).
23. Genetics by E. Altenberg – (Holt, Rinehart & Winston, New York).
24. Principles of Genetics by Gardner – (John Willey).
25. Principles of Genetics by Irwin H. Herskowitz – (Little Brown & Co., Boston).
26. Elementary Genetics by Singleton WR – (Van Nostrand).
27. Basic Human Genetics by Elain J. Mange & Arthur P. Mange – (Rastogi Publications, 2008).
28. Cytogenetics by P.K. Gupta – (Rastogi Publications, 2008)
29. Genetics by Winchester AM (1966) – Oxford & IBH Publishing CO.

CORE COURSE (ZOOLOGY)

COURSE NAME: ECOLOGY AND APPLIED ZOOLOGY PRACTICAL
COURSE CODE: EDU252

L	T	P	CR
0	0	3	2

THE INDIVIDUALISED SESSIONAL WORK: It will include practical's:

1. Estimation of dissolved oxygen in the pond water.
2. Estimation of dissolved alkalinity in the pond water.
3. Estimation of dissolved salinity in the pond water.
4. Population study of Local insects and ciliates in the culture medium for growth pattern (logistic and exponential curves).
5. *Study any five endangered/ threatened species- one from each class.*
6. Preparation of karyograms from the given photographs for karyotypic formula.
7. Study of Mendel 's laws, and deviations from Mendelian ratios using seed samples in the ratios of 9:7, 9:4:3, 13:3, 15:1, 12:3:1. Use Chi-Square Test for Testing the ratios
8. Isolation of chloroplasts by sucrose gradient. Photographs of Restriction site variation of chloroplast DNA
9. Detection of Blood groups (A B O & Rh factors)
10. Paternity disputes (blood groups)
11. Rearing of two races of silkworm from egg to cocoon stages – conditions required, quality and quantity of food provided, precaution taken during feeding, moulting and spinning.
12. Harvesting cocoons, reeling of silk from the cocoons, study of some economic traits – fecundity, larval duration, cocoon weight, shell weight and silk weight.

Field visit to study the common practices in rearing of honeybees and fish

Note: The above mentioned practical 's is in accordance with the guidelines of UGC. Practical 's involving animal material will be conducted using models/charts/e-resources. Minor modifications in the curriculum are allowed subject to the availability of resources. **The students will undertake a tour to study, identify HABITAT of marine and terrestrial animals.**

CORE COURSE (PHYSICS)

COURSE NAME: ANALOG SYSTEM AND APPLICATION
COURSE CODE: EDU254

L	T	P	CR
4	0	0	4

COURSE CONTENT

UNIT- I SEMICONDUCTOR DIODES

- Semiconductor materials, doping, Energy Level Diagram, Carrier transport in semiconductors: Conductivity and Mobility, Concept of Drift velocity, Barrier Formation in PN Junction Diode, Static and Dynamic Resistance, Current Flow Mechanism in Forward and Reverse Biased Diode and its applications, Zener diode and voltage regulation.

UNIT- II JUNCTION TRANSISTORS

- Bipolar Junction transistors: n-p-n and p-n-p Transistors, Current components in transistors, Characteristics of CB, CE and CC Configurations, Current gains α and β Relations between α and β, Load Line analysis of Transistors, DC Load l ine and Q- point. Physical Mechanism of Current Flow, Active, Cut off and Saturation Regions, Amplifiers: Transistor Biasing and Stabilization Circuits, Fixed Bias and Voltage Divider Bias, FET, MOSFET.

UNIT- III AMPLIFIERS

- Amplifiers, Classification of Class A, B & C Amplifiers, coupled amplifiers: Two stage R Coupled amplifier and its frequency response. Feedback in Amplifiers: Effects of Positive and Negative Feedback on Input Impedance, Output Impedance, Gain, Stability, Distortion and Noise.

UNIT- IV OPERATIONAL AMPLIFIER

- Operational Amplifiers Characteristics of an Ideal and Practical OpAmp (IC 741), Open-loop and Closed-loop Gain, Frequency Response, CMRR, Slew Rate, and concept of Virtual ground, Inverting and non-inverting amplifiers applications of Op Ampas Adder, Sub tractor, Differentiator, Integrator and Log amplifier.

SUGGESTED READINGS

1. J. Millman, and C. C. Halkias, Electronic Devices and Circuits. New Delhi: Tata McGraw Hill, 1983
2. J. D. Ryder, Electronic Fundamentals and Applications. New Delhi: Prentice Hall, 2004.
3. M. S. Tyagi, Introduction to Semiconductor Materials and Devices, Singapore: John Wiley & Sons Inc., 1991
4. M. S. Shu Introduction to Electronic Devices, Singapore: John Wiley & Sons Inc., 2000
5. B. G. Streetman and S. Banerjee, Solid State Electronic Devices, New Delhi: Prentice Hall India, 5thEdn, 2001.
6. S. Salivahanan and N.S. Kumar, Electronic Devices & circuits, 3rdEdn., New Delhi: Tata McGraw-Hill, 2012.
7. R.A. Gayakwad, OP-Amps and Linear Integrated Circuit, 4thEdn., New Delhi: Prentice Hall, 2000.
8. A.S. Sedra, K.C. Smith, A.N. Chandorkar, Microelectronic circuits, 6thEdn., Oxford: Oxford University Press, 2014.

CORE COURSE (PHYSICS)

COURSE NAME: ANALOG SYSTEM AND APPLICATION PRACTICAL
COURSE CODE: EDU256

L	T	P	CR
0	0	4	2

INDIVIDUALIZED SESSIONAL WORK: It will include the following activities:

1. To study V-I characteristics of PN junction diode, and Light emitting diode.
2. To study the V-I characteristics of a Zener diode and its use as voltage regulator.
3. To study (a) Half-wave Rectifier and (b) Full-wave Bridge Rectifier and investigate the effect of C, L and π filters.
4. To study the current voltage characteristics of the Tunnel diode.
5. Study of V-I & power curves of solar cells, and find maximum power point & efficiency.
6. To study the characteristics of a Bipolar Junction Transistor in CE, CB and CC configurations.
7. To study the various biasing configurations of BJT.
8. To design a CE transistor amplifier of a given gain (mid-gain) using voltage divider bias.
9. To study the frequency response of voltage gain of a RC-coupled transistor amplifier.
10. To design a phase shift oscillator of given specifications using BJT.
11. To study the characteristics of Junction Field Effect Transistor (JFET).
12. To study the characteristic of Metal Oxide Semiconductor Field Effect Transistor (MOSFET).
13. To study the frequency response of voltage gain of a RC-coupled transistor amplifier.
14. To design a Wien bridge oscillator for given frequency using an op-amp.
15. To design a phase shift oscillator of given specifications using BJT.
16. To study the Colpitts's oscillator.
17. To design a digital to analog converter (DAC) of given specifications.
18. To study the analog to digital convertor (ADC) IC.
19. To design an inverting amplifier using Op-amp (741, 351) for dc voltage of given gain
20. To design inverting amplifier using Op-amp (741, 351) and study its frequency response
21. To design non-inverting amplifier using Op-amp (741,351) & study its frequency response
22. To study the zero-crossing detector and comparator
23. To add two dc voltages using Op-amp in inverting and non-inverting mode
24. To design a precision Differential amplifier of given I/O specification using Op-amp.
25. To investigate the use of an op-amp as an Integrator.
26. To investigate the use of an op-amp as a Differentiator.

CURRICULUM AND PEDAGOGIC STUDIES

COURSE NAME: LANGUAGE ACROSS THE CURRICULUM

COURSE CODE: EDU272

L	T	P	CR
2	0	0	2

OBJECTIVES: The course will enable the student teachers to understand the

- Language background of students.
- Nature of classroom discourse.
- Nature and need of communication skills including reading and writing
- Role of Language Laboratory and its importance in developing language skills.

COURSE CONTENT

UNIT- I CONCERNS FOR LANGUAGE IN CURRICULUM

- Varied language contexts of the learners: dialect, regional varieties and standard language
- Understanding multilingualism in the classroom: challenges and strategies
- Home language and school language;

UNIT- II LANGUAGE AND CURRICULUM TRANSACTION

- Classroom Discourse- developing strategies for using oral language in the classroom
- Discussion as an approach for learning;
- The nature of questioning in the classroom- types of questions and teacher's role.

UNIT- III DEVELOPING COMMUNICATION COMPETENCIES- READING AND WRITING

- Reading in the content areas- Social Sciences, Science, Mathematics; Nature of Expository texts vs. Narrative texts; Transactional vs. Reflexive texts; Schema theory; text structures;
- Examining content area Textbooks; Reading strategies- such as Scanning, Skimming and Reading for Extracting Information
- Writing- based on the text, e.g., summary of the text, Extrapolation of story, converting situation into a dialogue, etc.; Process writing; analyzing students; writings to understand their conceptions; writing with a sense of purpose-writing to learn and understand.
- Making Reading-Writing connections: Note-making, Summarizing

UNIT- IV LANGUAGE LABORATORY

- Language laboratory– role of language laboratory in developing language skills,
- Planning and installing of language laboratory- basic requirement of language laboratory lab, Effective use of language lab.

INDIVIDUALIZED SESSIONAL WORK: It will include the following activities:

1. Designing Games and exercise for developing Listening, Speaking, Writing and Readings kills.
2. Organizing debates, Discussion, Seminars, Stage Speak, Public Speak and Drama.

TRANSACTIONAL MODALITIES

Communicative/Interactive and Constructivist approaches, imparting knowledge by means of creating situations. Teaching and learning of the course will be through a student-centred approach. Different interactive strategies, such as group discussions, presentations, and assignments will be applied to promote creativity. Independent learning will also be encouraged through class assignments. The course readings will be provided to students at the start of the course to inculcate the habit of reading. This will also help to raise the level of in-class discussion and make the course more dynamic.

SUGGESTED READINGS

1. Anderson, R.C. (1984). Role of the Readers Schema in Comprehension, Learning and Memory. In R.C. Anderson, J. Osborn & R.J. Tierney (ed.) Learning to Read in American schools: Based Readers and content texts. Hillsdale, Lawrence Erlbaum Associates: New Jersey.
2. Applying a Vygotskian Model of Learning and Development in B. Spode (ed.) Handbook of research on the education of young children. Macmillan: New York.
3. Armbruster, Bonnie B. (1984). The Problem of & quota; Inconsiderate Text & quota; In Duffy, G. G. (ed.) Comprehension Instruction, Perspectives and Suggestions. Longman: New York.

4. Butler, A. and J. Turn bill, (1984). Towards Reading-Writing Classroom Primary English Teaching Association Cornell University: New York.
5. Freedman S. W. and A. H. Dyson (2003). Writing in Flood J. et. al. Handbook of Research on Teaching English Language Arts: Lawrence Erlbaum Associates Inc: New Jersey, USA.
6. Kumar Krishna (2007). The Childs Language and the Teacher. National Book Trust: New Delhi.
7. Labov, W. (1972). The logic of Non- Standard English. In Language in Education. Prepared by Language and Learning course Team. Routledge: London.
8. Martin, Jr. B. (1987). The Making of a Reader: A Personal Narrative. In Bernice E. Cullinan, Children& Literature in the Reading Programme. International Reading Association: Michigan.
9. Mason, J. M. and S. Sinha (1992). Emerging Literacy in the Early Childhood Years.
10. Monson, R. J. (1991). Charting a New Course with Whole Language and Leadership.
11. Pinnell, G.S. (1985). Ways to Look at the Functions of Children Language. In A. Jaggar, M. Trika and Smith-Burke (ed.) Observing the language learner. International Reading Association: Newark, DE.
12. Purves, Alan C. (1988). The Aesthetic Mind of Louise Rosenblatt. Reader 20.
13. Rhodes, L. K. and N. L. Shanklin (1993). Windows into Literacy. Heinemann, the University of Michigan: UK.
14. Rothleen, L. and A. M. Mein Bach (1991). The Literature Connection: Using Children Books in Classroom. Good Year Books: Tucson, USA.
15. Sinha, S. (2000) Acquiring Literacy in Schools. Redesigning Curricula: A symposium on working a framework for School education Seminar.
16. Sinhala, Shaba. (2009). Theory of Reading: Exploring Literature. Contemporary Education Dialogue.
17. Teals, W. and E. Selby (1986). Introduction: Emergent Literacy as a perspective for Examining how young Children Become Writers and Readers. In W. Teals, E. Sulzby (ed.) Emergent Literacy: Writing and Reading. Norwood: New Jersey.

CURRICULUM AND PEDAGOGIC STUDIES

COURSE NAME: ASSESSMENT FOR LEARNING

L	T	P	CR
2	0	0	2

COURSE CODE: EDU274

OBJECTIVES: This course is designed to help student to:

- Understand the nature of assessment and evaluation and their role in teaching- learning process.
- Understand the importance of assessment in continuous and comprehensive manner
- Develop assessment tasks and tools to assess learner 's competence and performance
- Acquire skill of constructing an achievement test.
- Devise marking, scoring and grading procedures.
- Devise ways of reporting on student performance.
- Analyses manage and interpret assessment data.
- Develop the habit of reflecting-on and self-critiquing to improve performance.

COURSE CONTENT

UNIT-I INTRODUCTION TO ASSESSMENT AND EVALUATION

- Concept of test, measurement, examination, appraisal, evaluation and their interrelationships.
- Purpose and objectives of assessment- providing feedbacks, grading promotion, certification, diagnostic of learning difficulties.
- Forms of assessment: -
  - (Formative, Summative, prognostic; diagnostic; Norm referenced;
  - Criterion referenced based on purpose)

UNIT-II ASSESSMENT FOR/OF/AS LEARNING

- Concept of Cognitive, Affective, Psychomotor domain of learning
- Revised taxonomy of objectives (2001) and its implications for assessment and stating the objectives.
- Constructing table of specifications & writing different forms of questions- (VSA, SA, ET & objective type, situation based)
- Construction of achievement tests- steps, procedure and uses
- Construction of diagnostic Test- steps, uses &limitation

UNIT- III ASSESSMENT FORLEARNING

- Need for CCE its importance and problems faced by teachers
- Observation schedule; check-list; rating scale; anecdotal record cumulative Record.
- Assessment of group processes– Nature of group dynamics; Socio-metric techniques
- Quality assurance in tools– Reliability (Test-retest; equivalent forms, split- half) & Validity (Face, content, construct) –
  Procedure to establish them; Item analysis.
- Portfolio assessment– meaning, scope & uses; developing & assessing portfolio; development of Rubrics.

UNIT-IV CONSTRUCTION INTERPRETATION AND REPORTING OF STUDENT'S PERFORMANCE

- Interpreting student's performance
- Tabulation
- Descriptive statistics (measures of central tendency & measures of variability, percentages)
- Graphical representation (Histogram, Frequency Curves)
- Standard scores; T score, Z score, percentile and its uses
  Grading – Meaning, types, and its uses

INDIVIDUALIZED SESSIONAL WORK: It will include the following activities:

1. Choose any topic from your method and prepare an Advance Organizer for the same or prepare a Programmed Learning module bearing in mind Skinner 's Theory of Operant Conditioning
2. Preparation of a term paper describing the characteristics of effective teacher behavior.
3. To study effect of knowledge of results on the performance/learning. Collect 60 students 'raw scores and draw frequency distribution.
4. Administering any one of the standardized tests/ like self-esteem/interest/educational aspiration for secondary school and prepare a report on it.
5. Comparative study of quality performance indicator (QPI) of two different schools.
6. Appraisal of current CCA practices in the secondary schools.
7. Analysis of examination marks obtained by the students in any subject in a class and preparation of a report for sharing.
8. Organize online Assessment
9. Organize and manage the open book assessment
10. Constructing a table of specification on a specific topic (subject specific)
11. Constructing a unit test using table of specifications and administering it to target group and interpreting the result.
12. Analysis of question papers (teacher made)

SUGGESTED READINGS

1. Linn, Robert and Norman E Gronland (2000). Measurement and Assessment in teaching, 8th edition, by Prentice Hall, Inc, Pearson Education, Printed in USA
2. Ved Prakash, et.al. (2000). Grading in schools, NCERT, Published at the publication Division by the secretary, NCERT, Sri Aurobindo Marg, New Delhi
3. Tierney, R. J., Carter, M. A., & Desai, L. E. (1991). Portfolio Assessment in the Reading – Writing Classroom. Norwood, MA: Christopher-Gordon Publishers.
4. Glatthorn, A. A. (1998). Performance Assessment and Standards-based Curricula: The Achievement Cycle. Larchmont, NY: Eye no Education
5. Gredler, M. E. (1999). Classroom Assessment and Learning. USA: Longman.
6. Likert, R. (1932). A technique for the Measurement of Attitudes. Archives Psychology,40.
7. Mehrens, W. A. & Lehmann, I. J. (1991). Measurement and Evaluation in Education and Psychology (8 th ed.): Chapter 10: Describing Educational Data.
8. Oosterhof, A. (1994). Classroom Applications of Educational Measurement (Second Edition). New York: Macmillan College Publishing CompanyInc.
9. Payne, D. A. (2003). Applied Educational Assessment. Australia: Wadsworth: Thomson Learning.
10. Popham, W.J. (1981). Modern Educational Measurement. New Jersey, Engle wood Cliffs: Prentice-HallInc.

11. Popham, W. J. (2002). Classroom Assessment: What teachers need to know (Third Edition). Boston: Allyn &Bacon.
12. T.V. Somashekar (2006). Educational Psychology & Evaluation, Bangalore, NirmalaPrakashan

FIELD ENGAGEMENT/ INTERNSHIP/ DEVELOPING CRITICAL SKILLS

L	T	P	CR
0	0	1	1

COURSE NAME: PREPARING SCHOOL MAP
COURSE CODE: EDU292
Duration: 1 Week

Note: The purpose of preparing school maps will help in framing and managing classroom problems encountered during field experience. By consciously identifying classroom situations, writing brief descriptions, and discussing these in class, students develop important habits of how to reflect on classroom events.

Some points that can be covered are:

- Overall view of the school and classroom
- Kind of learning environment
- Seating arrangements
- Safety equipment's in this room
- Danger points in the room
- Interruptions during teaching- learning process
- Teachers dealing with the interruptions

Each pupil teacher will prepare a report and will submit it to the concerned teacher. This report will be evaluated and grades will be awarded.

Semester- V

COURSE	COMPONENT	NATURE	COURSE CODE	COURSE NAME	DISTRIBUTION OF HOURS			TOTAL CREDITS
					LECTURE	TUTORIAL	PRACTICAL	
1.	Discipline Specific Electives	Compulsory	EDU301	Chemistry	4	0	0	4
2.	Discipline Specific Electives	Compulsory	EDU303	Chemistry Practical	0	0	3	2
3.	Discipline Specific Electives	Compulsory	EDU345/ EDU309	Mathematics/ Zoology	6/4	0	0	6/4
4.	Discipline Specific Electives	Compulsory	EDU305/ EDU313	Botany/ Physics	4	0	0	4
5.	Discipline Specific Electives	Compulsory	EDU307/EDU315	y Practical/ Physics Practical	0	0	3	2
6.	Discipline Specific Electives	Compulsory	EDU311	Zoology Practical	0	0	3	2
7.	Skill Enhancement Course	Compulsory	EDU331	Understanding ICT and its Use in Teaching and Learning	0	0	6	4
8.	Perspectives in Education	Compulsory	EDU317	Health, Yoga and Physical Education	6	0	0	6
9.	Curriculum and Pedagogic Studies	Compulsory	EDU379/ EDU381/	Pedagogy of Mathematics- I/ Pedagogy of Biological Science- I	4	0	0	4
10.	Curriculum and Pedagogic Studies	Compulsory	EDU383	dagogy of Physical Science	4	0	0	4
11.	Field Engagement/ Internship/ Developing Critical Skills	Compulsory	EDU391	Observing PTM and Participating in PTM	0	0	1 Week	1
GRAND TOTAL								**39**

DISCIPLINE SPECIFIC ELECTIVES CHEMISTRY (COMPULSORY)
COURSE TITLE: PHYSICAL CHEMISTRY-II
COURSE CODE:EDU301

L	T	P	CR
4	0	0	4

OBJECTIVES:

- This course is intended to learn the basic concepts of Physical Chemistry.
- The various topics of the syllabus are grouped under different units in order to bring forth importance of academic and laboratory skills for the undergraduate students.

UNIT-I

Phase Equilibria

- Concept of phases, components and degrees of freedom, phase diagram for one component systems. Phase diagrams for systems of solid-liquid equilibria involving eutectic, congruent and incongruent melting points. Three component systems, water- chloroform-acetic acid system.
- *Binary solutions:* fractional distillation of binary miscible liquids (ideal and nonideal), azeotropes, CST. Nernst distribution law.

Surface chemistry

- Physical adsorption, chemisorption, adsorption isotherms. nature of adsorbed state.

UNIT- II

Chemical Kinetics

- Order and molecularity of a reaction, differential and integrated form of rate expressions up to second order reactions, experimental methods of the determination of rate laws, Temperature dependence of reaction rates; Arrhenius equation; activation energy. Collision theory of reaction rates.
- Enzyme catalysis, Michaelis-Menten mechanism, acid-base catalysis.

Conductance

- Arrhenius theory of electrolytic dissociation. Conductivity, equivalent and molar conductivity and their variation with dilution for weak and strong electrolytes. Molar conductivity at infinite dilution. Kohlrausch law of independent migration of ions. Debye-Hückel-Onsager equation.

UNIT- III

- **Electrochemistry**
- Quantitative aspects of Faraday's laws of electrolysis, rules of oxidation/reduction of ions based on half-cell potentials.
- 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. Application of EMF measurements in determining (i) free energy, enthalpy and entropy of a cell reaction, (ii) equilibrium constants, and (iii) pH values, using hydrogen, quinone- hydroquinone, glass and SbO/Sb_2O_3 electrodes. Qualitative discussion of potentiometric titrations (acid-base, redox, precipitation).

UNIT- IV

Photochemistry

- Characteristics of electromagnetic radiation, Lambert-Beer's law and its limitations, physical significance of bsorption coefficients. Laws, of
- photochemistry, quantum yield, actinometry, examples of low and high quantum yields, photochemical equilibrium and the differential rate of photochemical reactions, photosensitized reactions, quenching. Role of photochemical reactions in biochemical processes, photo stationary states, chemiluminescence.

SUGGESTED READINGS

1. Peter Atkins & Julio De Paula, *Physical Chemistry 9thEd.,* Oxford University Press, 2010).
2. Castellan, G. W. *Physical Chemistry*, 4th Ed., Narosa, 2004.
3. McQuarrie, D. A. & Simon, J. D., *Molecular Thermodynamics*, Viva Books Pvt. Ltd.: New Delhi, 2004.
4. Engel, T. & Reid, P. *Physical Chemistry 3rdEd.,* Prentice-Hall, 2012.
5. Assael, M. J.; Goodwin, A. R. H.; Stamatoudis, M.; Wakeham, W. A. & Will, S.
6. *Commonly Asked Questions in Thermodynamics.* CRC Press: NY, (2011).
7. Zundhal, S.S. *Chemistry concepts and applications* Cengage India, 2011.
8. Ball, D. W. *Physical Chemistry* Cengage India, 2012.
9. Mortimer, R. G. *Physical Chemistry 3rdEd.,* Elsevier: NOIDA, UP, 2009.
10. Levine, I. N. *Physical Chemistry 6thEd.,* Tata McGraw-Hill, 2011.
11. Metz, C. R. *Physical Chemistry 2ndEd.,* Tata McGraw-Hill, 2009.
12. Khosla, B. D.; Garg, V. C. & Gulati, A. *Senior Practical Physical Chemistry,* R. Chand & Co.: New Delhi, 2011.
13. Garland, C. W.; Nibler, J. W. & Shoemaker, D. P. *Experiments in Physical Chemistry8th Ed.;* McGraw-Hill: New York, 2003.
14. Halpern, A. M. & McBane, G. C. *Experimental Physical Chemistry 3rdEd.;* W.H. Freeman & Co.: New York, 2003.

DISCIPLINE SPECIFIC ELECTIVE CHEMISTRY (COMPULSORY)

COURSE TITLE: PHYSICAL CHEMISTRY-II
COURSE CODE:EDU303

L	T	P	CR
0	0	3	2

1. **INDIVIDUALIZED SESSIONAL WORK:** It will include the following activities:
2. Determination of critical solution temperature and composition of the phenol-water system and to study the effect of impurities on it.
3. Distribution of acetic/ benzoic acid between water and cyclohexane.
4. Study the kinetics of the following reactions. Integrated rate method: Acid hydrolysis of methyl acetate with hydrochloric acid, b. Saponification of ethyl acetate.
5. Verify the Freundlich and Langmuir isotherms for adsorption of acetic acid on activated charcoal.

Conductometry

1. Determination of equivalent conductance, degree of dissociation and dissociation constant of a weak acid.
2. Perform the following conductometric titrations:

a. Strong acid vs. strong base
b. Weak acid vs. strong base
c. Mixture of strong acid and weak acid vs. strong base
d. Strong acid vs. weak base

Potentiometry

Perform the following potentiometric titrations:

1. Strong acid vs. strong base
2. Weak acid vs. strong base
3. Dibasic acid vs. strong base
4. Potassium dichromate vs. Mohr's salt

DISCIPLINE SPECIFIC ELECTIVE (BOTANY)

COURSE NAME: PLANT PHYSIOLOGY, BIOCHEMISTRY AND BIOTECHNOLOGY
COURSE CODE: EDU305

L	T	P	CR
4	0	0	4

UNIT-I

- **Plant Water Relations**: Importance of water to plant life; imbibition, diffusion, osmosis, plasmolysis and deplasmolysis, concept of osmotic potential, water potential and its components; absorption of water, active and passive mechanism of water absorption; transport of water, ascent of sap; transpiration types, mechanism of opening and closing of stomata, mechanism of transpiration, factors affecting transpiration.

- **Mineral Nutrition**: Essential macro and micro elements and their role; mineral uptake; mechanism of mineral uptake.

UNIT-II

- **Nitrogen and Lipid Metabolism**: Biological nitrogen fixation; ammonia assimilation; structure and function of lipids; fatty acid biosynthesis; β– oxidation; saturated and unsaturated fatty acids.
- **Proteins**: Classification, role and structure (primary, secondary and tertiary) synthesis of amino acids.
- **Basics of Enzymology**: Discovery and nomenclature; classification, structure, properties, factors affecting enzyme activity, mechanism of enzyme action.

UNIT-III

- **Photosynthesis**: Significance, historical aspect; photosynthetic pigments; action spectra and enhancement effects; concept of two photosystems, cyclic and non-cyclic photophosphorylation; Calvin cycle; C4 pathway; CAM plants; photorespiration; factors affecting photosynthesis;
- **Respiration**: ATP—The biological energy currency; aerobic and anaerobic respiration; Kreb 's cycle; electron transport mechanism (Chemi-osmotic theory); redox potential; oxidative phosphorylation; pentose phosphate pathway; Respiratory quotient.

UNIT-IV

- **Growth and Development**: Definitions; phases of growth and development; kinetics of growth, factors affecting growth; seed dormancy, seed germination and factors of their regulation; plant movements; the concept of photoperiodism; Plant Hormones—auxins, gibberellins, cytokinin's, abscisic acid and ethylene, history of their discovery, biosynthesis and mechanism of action; photo morphogenesis.
- **Biotechnology**: Functional definition; basic aspects of plant tissue culture; cellular totipotency, differentiation and morphogenesis.

SUGGESTED READINGS

1. Dennis, D.T., Turpin, D.H. Lefebvre, D.D. and Layzell (eds.): Plant Metabolism (2nd Edition), Longman, Essex, England,1997.
2. Galston, A.W. Life Processes in Plants, Scientific American Library, Springer- Verlag, New York, U.S.A., 1989.
3. Hopkins, W.G. Introduction to Plant Physiology, John Wiley & Sons, Inc., New York, U.S.A., 1995.
4. Salisbury, F.B. and Ross, C.W.: Plant Physiology (4th Edition), Wadsworth Publishing Co., California, USA, 1992.
5. Srivastava, H.N. Plant Physiology, Biochemistry & Bio-technology, Pradeep Publication, Jalandhar, 2008.

DISCIPLINE SPECIFIC ELECTIVE (BOTANY)

L	T	P	CR
0	0	3	2

COURSE NAME: PLANT PHYSIOLOGY, BIOCHEMISTR AND BIOTECHNOLOGY PRACTICAL
COURSE CODE: EDU307

INDIVIDUALIZED SESSIONAL WORK: It will include the following activities:

1. To determine osmotic pressure of cell sap by plasmolytic method
2. To demonstrate osmosis through animal membrane/potato osmoscope.
3. To demonstrate plasmolysis and deplasmolysis.
4. To demonstrate transpiration, pull.
5. To compare the rate of transpiration from the two sides of a leaf using:

a. Vaseline method.
b. Cobalt chloride method.

6. To demonstrate the mechanism of opening and closing of stomata.
7. To demonstrate the path of ascent of sap.
8. To demonstrate that light is necessary for photosynthesis.
9. To demonstrate evolution of oxygen during photosynthesis in an aquatic plant.
10. To demonstrate aerobic respiration using flask method.

11. To demonstrate anaerobic respiration in germinating seeds or yeast.
12. To demonstrate phototropism.
13. To demonstrate geotropism using clinostat.
14. To separate chlorophyll pigments by solvent method.
15. To perform chemical analysis of plant ash for K^{+}, Ca^{2+}, Fe^{++}, Fe^{+++}, B^{3+}, Mn^{2+}, S^{2-} and Mg^{2+}.
16. To test for the presence of starch, proteins, amino acids and reducing sugars in plant material.

DISCIPLINE SPECIFIC ELECTIVE (ZOOLOGY)

COURSE NAME: THEORY-CELL BIOLOGY, GENETICS AND EVOLUTION

COURSE CODE: EDU309

L	T	P	CR
4	0	0	4

UNIT- I

- Cell theory; Protoplasm and its properties, Definition, history, prokaryotic and eukaryotic cells, virus, viroid's, mycoplasma, Electron microscopic structure of eukaryotic cell, Plasma membrane – Different models of plasma membrane.

UNIT- II

- Cell organelles: Structure and functions of Endoplasmic Reticulum
- Structure and functions of Golgi apparatus, Lysosomes, Ribosomes, Mitochondria, Nucleus
- Chromatin - Structure and significance, Chromosomes - Structure, types, functions
- Cell-cycle; Mitosis; Meiosis; Theory of chiasma formation. Cytoskeleton and Cell Movement:
- Structure and organization of actin filaments; actin, myosin and cell movement; intermediate filaments; microtubules.

UNIT- III

- Genetics– I: Mendel's work on transmission on traits, Principles of inheritance, Incomplete dominance and co dominance, Lethal alleles, Epistasis, Pleiotropy
- Genetics – II: Sex determination, Sex linked inheritance, Linkage and crossing over, Extra chromosomal inheritance, Human karyotyping

UNIT- V

- Origin of life, Lamarckism, Darwinism, Neo – Darwinism, Hardy-Weinberg Equilibrium., Variations, isolating mechanisms, natural selection, Types of natural selection (directional, stabilizing, disruptive), Artificial selection and forces of evolution, Speciation (Allopatric and Sympatric), Macro evolutionary principles (Example: Darwin 's finches), Study of five animals for mimicry, Evolution of man, Evolution of dinosaurs, Evolution of horse.

SUGGESTED READINGS

1. Cell and Developmental Biology by Sastry, Singh & Tomar – (Rastogi Publications, 2008).
2. Karp, G. 2010. Cell and Molecular Biology: Concepts and Experiments. 6th Edition. John Wiley & Sons. Inc.
3. De Robertis, E.D.P. and De Robertis, E.M.F. 2006. Cell and Molecular Biology. 8th edition. Lippincott Williams and Wilkins, Philadelphia.
4. Cooper, G.M. and Hausman, R.E. 2009. The Cell: A Molecular Approach. 5th edition. ASM Press & Sunderland, Washington, D.C.; Sinauer Associates, MA.
5. Becker, W.M., Kleinsmith, L.J., Hardin. J. and Bertoni, G. P. 2009. The World of the Cell. 7th edition. Pearson Benjamin Cummings Publishing, San Francisco.
6. Cell and Molocular Biology by P.K. Gupta – (Rastogi Publications, 2008).
7. Cell Biology by C.B. Powar – (Himalya Publishing House, Bombay).
8. Cell Biology by De Robertis*et.al* – (W.B. Saunders, Philadelphia).
9. A Textbook of Cytology by R.C. Dalela and S.R. Verma – (Jaiprashnath & Co., Meerut).
10. Cell Biology by J.D. Burke – (Scientific Book Agency, Calcutta
11. Cell Biology: A molecular approach by R.D. Dyson – (Allyn & Bacon, Boston).
12. Cell Biology by R.M. Dowben – (Harper & Row, New York).
13. Cell function by L.L. Langley – (Affiliated East West Press, New Delhi).
14. Cytology by C.D. Darlington.
15. Genes (Vol. I – VII) by Levin B. – CBS Publishers.

16. Cell and Molecular Biology by De Robertis EDP & De Robertis EMI. Jr (1996) – Holt WB Saunders International.
17. Essentials of Molecular Biology by Feirfelder I (1997) – Narosa Publ. New Delhi.
18. Cytology, Genetics & Evolution by Gupta PK (1992) – Rastogi Publications.
19. Principles of Biochemistry by Lehninger AL, Nelson DL & MM Cor (1993) – Kalyani Publishers, New Delhi.
20. Cytology & Cytogenetic by Swanson CP (1972) – MacMillan Co.
21. Animal Cytology and Evolution by MJD White – Cambridge University Press.
22. Evolutionary Biology by B.S. Tomar & S.P. Singh – (Rastogi Publications, 2008). The origin of life by K. John – (Reinhold Publishing Corpn).
23. The evolution of Man by G.W. Lasker – (Holt, Rinehart & Winston).
24. Organic Evolution by R.S. Lull – (MacMillan).
25. Evolution by J.M. Savage (Holt, Rinehart and Winston)
26. Genetics and Evolution by RL Kochhar (S. Nagin& Co, New Delhi 1970)
a. Evolution in Action by J. Huxley (New American Library, New S. Nagin & Co, New Delhi 1970).
27. The Origin of Species by D.I. Charles (Collier Book, New York, 1966).
28. Evolution by Ayala F.G, Stebbins G.L & Valentine J. (1965) – Sinauer Associates.
29. Animal Evolution by Carter GS (1960) – Sedgenick and Johnson Ltd.
30. Zoogeography by Hubbs CL (1962) – AAAAS Washington
31. Evolution & Genetics by Morrel DJ (1962) – Holt Rinehart and Winston.
32. Vertebrate Paleontology by Romer AS (1966) – University Chicago Press.
33. The Process of Organic Evolution by Stebbins GL (1970) – Prentice Hall Publication.

DISCIPLINE SPECIFIC ELECTIVE (ZOOLOGY)

L	T	P	CR
0	0	3	2

COURSE NAME: THEORY- CELL BIOLOGY, GENETICS AND EVOLUTION PRACTICAL
COURSE CODE: EDU311

INDIVIDUALIZED SESSIONAL WORK: It will include the following activities:

- Microscope: Simple and compound microscope, working mechanism and maintenance
- Study of bacterial and eukaryotic cell.
- Slides of sub cellular components (Cell organelles)
- Erythrocyte plasma membrane permeability.
- Study of Karyotype and Idiogram of man.
- Study of Barr Bodies in human buccal epithelial cells.
- Identification of blood groups (ABO) and Rh factor in man.
- *Drosophila* culture and life cycle.
- Sexual Dimorphism in *Drosophila,* Identification of wild or mutant varieties.
- Study of salivary gland chromosomes of Drosophila
- Problems on pedigree analysis.
- Meiotic studies of testes of cockroach.

DISCIPLINE SPECIFIC ELECTIVE (PHYSICS)

L	T	P	CR
4	0	0	4

COURSE NAME: SOLID STATE PHYSICS
COURSE CODE: EDU313

UNIT- I SOLIDS

- Amorphous and Crystalline Materials, Lattice Translation Vectors, Lattice with a Basis – Central and Non-Central Elements, Unit Cell, Types of Lattices- hexagonal close packed structure. FCC and BCC structure, simple crystal structure, Miller Indices, Reciprocal Lattice, Reciprocal lattice to SC, BCC and FCC lattic, Brillouin Zones, Diffraction of X- rays by Crystals, Bragg 's Law, Atomic and Geometrical Factor.

UNIT- II ELEMENTARY LATTICE DYNAMICS

- Lattice Vibrations and Phonons, Linear Monoatomic and Diatomic Chains, Acoustical and Optical Phonons,

Qualitative Description of the Phonon Spectrum in Solids, Dulong and Petit 's Law, Einstein and Debye theories of specific heat ofsolids,

UNIT-III FREE ELECTRON THEORY

- Drude Lorentz theory, Sommerfeld model, the Fermi Dirac distribution, Effect of temperature on FD distribution, electronic specific heat, the electrical conductivity and Ohm 's Law, the thermal conductivity of metals. Wiedemann Frenz law, Hall Effect.

UNIT- IV ELEMENTARY BAND THEORY

- Kronig Penny model. Band Gaps. Conductors, Semiconductors and Insulators, P and N type Semiconductors. Conductivity of Semiconductors, Mobility, Hall Effect, Hall coefficient, Superconductivity: Experimental Results, Critical Temperature, Critical magnetic field, Meissner effect, Type I and type II Superconductors, London 's Equation and Penetration Depth, Isotope effect.

SUGGESTED READINGS

1. Charles Kittel, Introduction to Solid State Physics, 8thEd., Wiley India Pvt. Ltd. 2004.
2. J.P. Srivastava, Elements of Solid-State Physics, 2nd Ed., Prentice-Hall of India, 2006.
3. Leonid V. Azaroff, Introduction to Solids, Tata Mc-Graw Hill, 2004.
4. N.W. Ashcroft and N.D. Mermin, Solid State Physics, Cengage Learning, 1976.
5. Rita John, Solid State Physics, McGraw Hill, 2014
6. H. Ibach and H. Luth, Solid-state Physics, Springer, 2009.M. Ali Omar, Elementary Solid-State Physics, Pearson India, 1999M.A. Wahab, Solid State Physics, Narosa Publications, 2011.

DISCIPLINE SPECIFIC ELECTIVE (PHYSICS)

COURSE NAME: SOLID STATE PHYSICS PRACTICAL

L	T	P	CR
0	0	4	2

COURSE CODE: EDU315

INDIVIDUALIZED SESSIONAL WORK: It will include the following activities:

1. To measure the Magnetic susceptibility of Solids.
2. To determine the Coupling Coefficient of a Piezoelectric crystal.
3. To draw the BH curve of Fe using Solenoid & determine energy loss from Hysteresis.
4. To measure the resistivity of a semiconductor (Ge) with temperature by four-probe method (room temperature to 150ºC) and to determine its bandgap.
5. To determine the Hall coefficient of a semiconductor sample.
6. To study temperature coefficient of resistance of Cu.
7. To measure the thermal conductivity and thermal diffusivity of a conductor.
8. To determine the value of Stefan's Constant of radiation.
9. To measure magnetic volume susceptibility of liquid FeCl2/MnSO solution by Quincke 's method.
10. To measure dielectric constant of a non-polar liquid and its applications.
11. To study the reverse saturation current to a PN junction diode at various temperatures and to find out the approximate value of the energy gap.

SKILL ENHANCEMENT COURSE

L	T	P	CR
0	0	4	4

COURSE NAME: UNDERSTANDING ICT AND ITS USE

IN TEACHING AND LEARNING

COURSE CODE: EDU331

OBJECTIVES: The course will enable the student teachers to:

1. Appreciate the historical development of various educational media.
2. Demonstrate understanding of the main components of the computer hardware in use.
3. Use various digital technologies (hardware and software) for creating resources and providing learning experiences for all types of learners (including differently abled).
4. Use various ICTs for project based/problem-based constructivist learning environment

5. Explain the role of ICT in authentic and alternative assessment
6. Understand the social, economic, and ethical issues associated with the use of ICT

UNIT- I INTRODUCTION TO INFORMATION AND COMMUNICATION TECHNOLOGY

- Use of Technology in Education: In Retrospect.
  Information and Communication Technology: Meaning, nature and advantages
- Recent development in ICT
  - Cloud computing
  - E- books
  - Mobile learning
  - One to one computing
  - Ubiquitous learning
  - Small classrooms
  - Google groups
  - Google classrooms
  - Google Docs
  - Kindle

UNIT- II ICT AND PEDAGOGY

- Approaches to integrating ICT in teaching and learning: Technological Pedagogical Content Knowledge (TPCK)
- Subject specific ICT tools for creating and facilitating learning
- Subject specific online resources and their use
- Designing technology integrated learning experiences
- ICT integrated Unit plan– Use of Web 2.0 for creating constructivist learning environment
- Assistive technology for children with special needs: Tools and processes; Universal Design for Learning (UDL)
- ICT for Pedagogical Innovations
  - Project/problem-based learning (PBL): Role of ICT in developing technology integrated PBL unit
  - Web Quest and virtual field trips: Concept, process, and use in the classroom
  - Multiple intelligences in classroom: ICT tools and applications
  - Mobile learning and related applications
  - Open Educational Resources – Meaning and importance, various OER initiatives
  - Massive Open Online Courses (MOOC)-Concept and use
  - Flipped classrooms: Meaning and possibilities

UNIT- III ICT FOR ASSESSMENT

- ICT and Assessment
  - Electronic assessment portfolio – Concept and types; e-portfolio tools
  - Creating and use of electronic rubrics for assessment
  - Online and offline assessment tools – Rubrics, survey tools, puzzle makers, test generators, reflective journal, question bank
  - ICT applications for CCE
  - Learning analytics and feedback

UNIT- IV ICT FOR MANAGEMENT

- ICT and Management
  - ICT initiatives and standards
  - ICT for personal management: e-mail, task, events, diary, networking
  - ICT for educational administration: Scheduling, record keeping, student information, electronic grade book, connecting with parents and community
  - Computer security: Privacy, hacking, virus, spy ware, misuse, abuse, antivirus, firewall, and safe

practices

INDIVIDUALIZED SESSIONAL WORK

- Creating account in wikispace/wikipedia/mediawiki and adding/editing content
- Developing an educational blog in www.blogger.com, www.wordpress.com, or
- www.edublog.co
- LMS experience- hands on various features of LMS– the ICT course may be provided through LMS
- Evaluation of RLO repositories and creating RLO and uploading to repositories
- A critical study of some e-learning courses and enrolling and completing some free- learning courses
- Developing a multimedia e-content for a topic using eXe Learning
- Field visit to the EDUSAT center and take part in teleconferencing
- Planning and creating digital rubrics for any topic
- Organize web conferencing using Skype/Yahoo Messenger/Google+
- Review of ICT labs (plans and equipment/resources) in school from internet
- Interview of computer hardware engineer/ICT specialist regarding Hardware planning, evaluation, maintenance and up gradation
- Developing an electronic assessment portfolio
- Developing an electronic teaching portfolio
- Readings on emerging ICT trends in education
- Review of national ICT policy and curriculum
- Using FOSS tools for timetabling, grade sheet
- Creating social bookmarking account and creating social bookmarking of internet resources using any social bookmarking tools (diigo, delicious, stumbleupon, Shelfari)
- Hands on experience in setting up a desktop PC and working with various input devices, output devices, storage devices, and display devices
- Practicing word processing using Indian language software
- Practice in installing various system and application software
- Using word processor, spread sheet, and presentation software to produce various teaching learning resources and sharing it online
- Locating internet resources – navigating, searching, selecting, saving and evaluating
- (use standard internet evaluation criteria)
- Creating digital concept maps, flow charts, timelines for a particular content
- Creating screen cast video of a lesson
- Creating a podcast using audacity and sharing it on podcasting site
- Shooting, editing, and sharing of videos segment on any educational topic
- Creating a simple 2D animation using pencil or Tupi
- Creating and editing various graphics
- Creating account in teacher tube/ slide share and sharing video/presentation.

Viewing and commenting on others' contributions:

- Enrolling and completing some MOOC courses of interest
- Creating resources for flipped classroom and practicing flipped learning in school
- Evaluating OER resources. Creating and sharing OER materials
- Developing technology integrated unit/lesson plans and trying out in schools
- Hands on experience on subject specific software tools like Geogebra, PhET, Stellarium, etc.
- Taking part in an ICT integrated online project based or problem-based learning activity

SUGGESTED READINGS

1. Ahmad, J., Ahmad, M.S. and Khan, A. (2012), *Computer Applications in Education*, Neelkamal Publication, Hyderabad, PP-288, ISBN: 978-81-8316-293-7.

2. Bharihok, D. (2000). *Fundamentals of Information Technology*. Pentagon Press: New Delhi.
3. CEMCA (2014). *Technology Tools for Teachers*, Commonwealth Educational Media Center for Asia, 13/14 Sarva Priya Vihar, New Delhi.
4. David, M. (2009). *Project Based Learning- Using Information Technology*- Second Edition. Viva Books: New Delhi.
5. James, K.L. (2003). *The Internet: A User's Guide*. Prentice Hall of India Pvt. Ltd: New Delhi.
6. Laxman Mohanty, Neeharika Vora (2008). *ICT strategies for schools- a guide for school administrators*. Sage Publications: New Delhi.
7. Manoj Kumar Dash (2010). *ICT in teacher development*, Neel Kamal Publications: New Delhi.
8. MHRD-GOI (2004 and revised 2010) National ICT @ Schools Scheme, Department of School Education and literacy, MHRD, Govt. of India, New Delhi
9. MHRD-GOI (2012) National Mission on Education through ICTs (NME-ICT), Department of Higher Education, MHRD, Govt. of India, New Delhi
10. Mishra, S. (Ed.) (2009). STRIDE Hand Book 08: E-learning. IGNOU: New Delhi. Available at http://webserver.ignou.ac.in/institute/STRIDE_Hb8_webCD/STRIDE_Hb8_ index.html
11. Mohit K (2003). Design and implementation of Web-enabled Teaching Tools: IRM Press, UK.
12. NCERT (2013). Information and Communication Technology for School System: Curricula for ICTs in Education (students and Teachers), Version-1.2, CIET-NCERT, NCERT, New Delhi (www.ictcurriculum.gov.in).
13. NCERT (2013). National Repository of Open Educational resources (NROET), CIETNCERT, NCERT, New Delhi (nroer.gov.in).
14. Roblyer M.D., Aaron H. Doering (2012). Integrating Educational Technology into Teaching (6th Edition).
15. Pradeep Kumar (2011). Web Resources in Pedagogy.Apple Academics: Oakville.
16. Semenov, Alexy (2005). Information and Communication Technologies in Schools. A handbook for Teachers. UNESCO.
17. UNESCO. (2002). UNESCO Report: Information and Communication Technologies in Teacher Education, A Planning Guide, Division of Higher Education, UNESCO.
18. UNESCO. (2002). UNESCO Report: Information and Communication Technology in Teacher Education, A Curriculum for Schools and Programme of Teacher Development. Division of Higher Education, UNESCO.

PERSPECTIVES IN EDUCATION

COURSE NAME: HEALTH, YOGA AND PHYSICAL EDUCATION

COURSE CODE: EDU317

L	T	P	CR
6	0	0	6

OBJECTIVES: To enable the student teachers to

- Acquire knowledge about physical and health education.
- Understand the rules and the regulations of sports and games.
- Develop the skills in organizing the physical education programmes in schools.
- Develop the activities required for organizing physical education meets and events.
- Acquire knowledge about recreation, health and safety education
- Acquire knowledge about common communicable diseases.
- Understand the nature of injuries and to provide first aid.

1. Acquire knowledge about yoga and physical exercises.
2. Create awareness on different aspects of health and fitness.
3. Understand the diet modification in the treatment of underweight and obesity.

COURSE CONTENT

UNIT- I INTRODUCTION TO PHYSICAL EDUCATION

- Meaning, Definition, Aims, Objectives, Scope and Importance of Physical Education- Physical Fitness-

Meaning, Definition, Components and Benefits - Origin and Development of Ancient and Modern Olympics - Olympic torch, Olympic Flag, Marathon Race, Difference between Ancient and Modern Olympic Games - Recreational activities.

UNIT- II CONCEPT OF HEALTH EDUCATION

- Meaning, Definition, Aims, Objectives and Importance of Health Education– Nutrition - Malnutrition - Personal Hygiene - Health Education in Schools - Health Instruction, Health Services, Safety Education: Importance with reference to Schools, Play fields, Road, School and Home - First Aid: Road, Water, Fire accidents and Snake bite - Common sports injuries: Strain, Sprain, Contusion, Laceration, Fractures and Dislocation.

UNIT- III FIRST AID- PRINCIPLES AND USES

- Principles of first aid, first aid equipment's, Fracture - causes and symptoms and the first aid related to them, Muscular sprain causes, symptoms and remedies, first aid related to hemorrhage, respiratory discomfort, first aid related to natural and artificial carriage of sick and wounded persons, Treatment of unconsciousness, Treatment of heat stroke.

UNIT- IV YOGA, PHYSICAL EXERCISES AND FITNESS

- Meaning, Definition and Uses of Yoga - Essentials of Yogic Practices- Eight limbs of Yoga- Methods and Benefits of selected Asanas and Pranayama- Physical Exercises, Types: Aerobic, Anaerobic, Effects of Physical Exercises on various systems - Circulatory, Muscular, Digestive and Respiratory systems - Difference between Physical Exercises and Yoga- Fitness components and its importance - Effect of Physical Exercises on human body systems.

INDIVIDUALIZED SESSIONAL WORK: It will include the following activities:

1. Preparation of first aid kit.
2. First aid for road, water, fire accidents and athletic injuries
3. Preventive measures for health hazards
4. Demonstration of Asanas and Pranayama
5. Power point presentations for a topic in the syllabus
6. Preparing a report of the achievements of eminent players
7. Strategies for positive thinking and motivation

TRANSACTIONAL MODALITIES

- Communicative/Interactive and Constructivist approaches, imparting knowledge by means of creating situations. Teaching and learning of the course will be through a student- centered approach. Different interactive strategies, such as group discussions, presentations, and assignments will be applied to promote creativity. Independent learning will also be encouraged through class assignments. The course readings will be provided to students at the start of the course to inculcate the habit of reading. This will also help to raise the level of in-class discussion and make the course more dynamic.

SUGGESTED READINGS

1. Agarwal, Satya, P. (1998). The social role of the Gita: How and why, Motilal Banarsidass.
2. Goel Devraj & Goel Chhaya (2013) Universe of Swami Vivekananda & Complete Wholistic Cocial Development, CASE Publication under UGC SAP, The M.S University of Baroda, Vadodara.
3. Porter, Noah. (2003) Falung Gong in the United States: An Ethnographic Study, Master Thesis, Department of Anthropology, College of Arts and Sciences, University of South Florida.
4. Dhanajoy, S., & Seema, K. (2007). Lesson planning: Teaching methods and class management in physical education. New Delhi: Khal Sahitya Kendra.
5. Nash T.N. (2006). Health and physical education. Hyderabad: Nilkamal Publishers.
6. Prasad, Y. V. (2006). Method of teaching physical education. New Delhi: Discovery Publishing house.
7. Sachdeva, M. S. (2006). School organization, administration and management. Ludhiana: Dandon Publication.
8. Chandra, S., Sothi, & Krishnan.P. (2005). Health education and physical education. Delhi: Surject Publications.
9. Mangal, S. K. (2005). Health and physical education. Ludhiana: Tandon Publication book market.
10. Ajmer, S. (2003). Essentials of physical education. New Delhi: Kalyani Publishers.

11. Tiwari, O. P. (2002). Asana: Why and how. India: Kanalyadhama.
12. Hedge, (1997). How to maintain good health. New Delhi: UBPSD Publishers.
13. Kanele., B. S., & Kumar, C. P. (1996). Text book on health and physical education. Ludhiana: Kalyana Publishers.
14. Reema, K. (1996). Physical fitness. New Delhi: Khel Sahitya Sports Publication.
15. Dambrosa, D., & Robert, D. (1993). Prevention and treatment and running injuries. New Jersey: Slack Incorpor Road.
16. Krishna, G. (1993). The purpose of yoga. New Delhi: UBS Publishers Ltd.
17. Ramachandran, L.T., & Dharmalingam. (1993). Health education. A new approach. New Delhi: Vikas Publishers Ltd.
18. Charles, B. A. (1992). Foundation of physical education and sport. New Delhi: B1 Publication.
19. Eriksson, O. B. (1990). Sports medicine, health and medication. Enfield: Guninness.

DISCIPLINE SPECIFIC ELECTIVE (MATHEMATICS)

L	T	P	CR
6	0	0	6

COURSE TITLE: ANALYSIS

COURSE CODE: EDU345

OBJECTIVES: After the completion of the semester the students will be able to:

- Discuss integrals of various types
- Prove various theorems related with integral calculus.
- Explain improper integrals and their convergence along with various details of functions with their parameters.
- Discuss sequences and series of functions, uniform convergence.
- Work out various tests and theorems related to convergence.

UNIT- I

- Riemann integral, Integrability of continuous and monotonic functions. The fundamental theorem of integral calculus. Mean value theorems of integral calculus Improper integrals and their convergence, Comparison tests, Beta and Gamma functions. Frullani's integral. Integral as a function of a parameter. Continuity, derivability and integrability of an integral of a function of a parameter [Scope as in Chapters 6 (excluding Section 6.6.3), 9,15 (Sections 15.1-15.14 only) of the books 'A Course of Mathematical Analysis' by Shanti Narayan, Twelfth edition]

UNIT- II

- Double and triple integrals, Fibonis theorem without proof, change of order of integration in double integrals, Volume of a region in space, triple integrals in spherical and cylindrical coordinates, substitution in multiple integrals [Scope as in sections 13.1 to 13.4, 13.6, 13.7 of chapter 13 in the book Calculus and Analytical Geometry by G.B. Thomas and R.L. Finney, 9th Edition]

UNIT- III

- Sequences and series of functions, point wise and uniform convergence, Cauchy criterion for uniform convergence, Weierstrass M-test, Abel's and Dirichlet's tests for uniform convergence, uniform convergence and continuity, uniform convergence and uniform convergence and differentiation

UNIT- IV

- Weiervstrass approximation theorem, power series, interval of convergence of power series, Abel's and Taylor's theorems for power series Fourier series, Fourier expansion of piecewise monotonic functions [scope as in relevant sections of chapters 12, 13, 14 of the book Mathematical Analysis (2nd edition) by S.C. Malik and Savita Arora]

SUGGESTED READINGS

1. Apostol, T.M. (1985). Mathematical Analysis. Norosa Publishing House, New Delhi.
2. Goldberg, R.R. (1970). Real Analysis. Oxford & IBH Publishing Co., New Delhi.
3. Lang, S. (1983). Undergraduate Analysis. Springer-Verlag, New York.

4. Somasundaram, D. & Choudhary, B. (1997). A First Course in Mathematical Analysis. Narosa Publishing House, New Delhi.
5. Narayan, S. (2000). A Course of Mathematical Analysis. S. Chand & Co., New Delhi.
6. Jain, P.K. & Kaushik, S.K. (2000). An Introduction to Real Analysis. S. Chand & Co., New Delhi.
7. Malik, S.C. & Arora, S. (1999). Mathematical Analysis. 2nd Edition, New Age International Publishers.

CURRICULUM AND PEDAGOGIC STUDIES

L	T	P	CR
4	0	0	4

COURSE NAME: PEDAGOGY OF ENGLISH- I

COURSE CODE: EDU373

UNIT- I NATURE AND ROLE OF LANGUAGE

- Meaning, Characteristics, Functions of Language; Principles of Language Teaching
- Nature of English Language, Aims and Objectives of Teaching English in India, Status of English Language in the global and Indian context, Factors affecting Language Learning (Physiological, Psychological and Social)

UNIT- II ROLE AND POSITION OF LANGUAGES- CONSTITUTIONAL PROVISIONS AND POLICIES OFLANGUAGE EDUCATION

- Teaching English in Bilingual/Multilingual Contexts - Teaching English as a Second Language, Language and Educational Policy in India
- Constitutional Provisions and Policies of Language Education, Difference between language as a school subject and language as a Medium of Instruction.

UNIT- III LANGUAGE TEACHING- AN OVERVIEW

- Different approaches/theories to language learning & teaching - Grammar–Translation Method, Direct Method, Audio-Lingual Method, Structural Approach, Situational Approach, Dr. West‘s New Method, Bilingual Method, Total Physical Response, Whole Language, Communicative Language Teaching, Natural Approach, Deductive Method, Inductive Method, Multilingual Pedagogical Approach, Constructive Approach

UNIT-IV LINGUISTIC BEHAVIOUR AND SYSTEM AND DEVELOPING LANGUAGE SKILLS

- **Linguistic system**- Introduction to Phonetics
- **Grammar in context; vocabulary in context**.
- **Acquisition of language skills - listening, speaking, reading and writing.**
- Listening and Speaking- Sub skills of listening: Tasks; Materials and resources for developing the listening and speaking skills: storytelling, dialogues, situational conversations, role plays, simulations, speech, games and contexts, language laboratories, pictures, authentic materials and multi-media resources.
- Reading- Sub skills of reading; Importance of understanding the development of reading skills; reading aloud and silent reading; extensive and intensive reading; Study skills including using thesauruses, dictionary, encyclopedia etc.
- Writing- Stages of writing; Process of writing; Formal and Informal writing such as poetry, short story, letter, diary, notices, articles, reports, dialogue, speech, advertisement etc. Reference skills; Study skills; Higher order skills.

PRACTICUM

- Discussion on
  - Position paper on Teaching of English
  - Position paper on Teaching of Indian Languages
  - Multilingualism as a resource

- Analysis of advertisements aired on Radio/Television on the basis of language and gender.
- Discuss in groups how the role of English language has changed in the 21st century.
- Topic for Debate Globalization & English
- Discussion on the topic War begins When Words Fail
- Keeping in view the topics given in this unit, prepare a questionnaire. Interview ten people and write a report on English Language in India.

Project

- Take a few passages from science, social-science and math's text books of classes VI to VII and analyze:
  - How the different registers of language have been introduced?
  - Does the language clearly convey the meaning of the topic being discussed?
  - Is the language learner friendly?
  - Is the language too technical?
  - Does it help in language learning?
  - Now write an analysis based on the above issues.
- Do a survey of five schools in your neighborhood to find out –
  - Level of Introduction of English
  - Materials (textbooks) used in the classroom
- Now prepare a report on the challenges faced by the teachers and the learners in the teaching-learning process.
- Prepare a report on the status of languages given in the constitution of India and language policies given in Kothari Commission, NPE-1986, and POA-1992.
- Visit 5 schools in the neighborhood and prepare a report on the three-language formula being implemented in the schools.
- Discussion on the topic Mother Tongue and Other Tongue
- Do a comparative study of positive features and weaknesses of different approaches to language learning.
- Keeping in view the needs of the children with special needs prepare two activities for English teachers.

CURRICULUM AND PEDAGOGIC STUDIES

L	T	P	CR
4	0	0	4

COURSE NAME: PEDAGOGY OF HINDI- I

COURSE CODE: EDU375

OBJECTIVES

- Hkkoh f'k{kdksa esa fgUnh f'k{k.k ds fy, Hkk"kk lEcU/h vk/kjHkwr ;ksX;rkvksa dk fodkl djukA
- Hkkoh f'k{kdksa esa fgUnh Hkk"kk f'k{k.k lEcU/h ;ksX;rkvksa dk fodkl djukA
- Hkkoh f'k{kdksa esa fgUnh f'k{kksijkUr visf{kr dq'kyrkvksa dk fodkl djukA
- Hkkoh f'k{kdksa esa fgUnh lEcU/h fofHkUu d{kksÙkj Hkkf"kd ,oe~ lkfgfR;d fØ;kvksa ds vk;kstu dh {kerkdk fodkl djukA
- lgk;d lkexzh ds fuekZ.k ,oe~ iz;ksx dh dq'kyrk dk fodkl djukA

UNIT- I

- Hkk"kk&vFkZ] vk/kj ,oa izd`fr
- nsoukxjh fyfi dh fo'ks"krk,a ,oa lhek,¡

 fgUnh Hkk"kk dk egÙo&ekr`Hkk"kk ,oe~ jk"Vªh; Hkk"kk ds :i esa
 fgUnh f'k{k.k ds lkekU; ,oe~ Lrjkuqdwy (fof'k"V) mn~ns';
 Hkk"kk f'k{k.k ds lkekU; fl¼kUr ,oa lw=k

UNIT- II

 cksypky dh f'k{kk&egÙo mn~ns'; ,oa fof/;kj
 mPpkj.k dh f'k{kk&egÙo] mPpkj.k nks"k ds dkj.k] mik;
 O;kdj.k f'k{k.k&egÙo] mn~ns'; ,oa fof/;kj
 ys[ku f'k{k.k&egÙo] mnns'; ,oa fof/;kj

UNIT- III

 x| f'k{k.k&mn~ns';] lksiku ,oe~ fof/;kj
 i| f'k{k.k&mn~ns';] lksiku ,oe~ fof/;kj
 okpu f'k{k.k&mn~ns';] okpu eUnrk ds dkj.k ,oa mik;

UNIT- IV

 n`';&JO; lk/u&iz;ksx ,oa egÙo
 ikB~;&iqLrd dh fo'ks"krk,¡ ,oa fgUnh f'k{k.k esa ikB~;&iqLrd dk egÙo
 Hkk"kk f'k{k.k esa iqLrdky; dh mi;ksfxrk
 fgUnh vè;kid ds xq.k
 fgUnh esa ewY;kadu ,oa ijh{kk,¡&vfHkizk;] egÙo o fofo/ izdkj
 x`gdk;Z&Lo:i] la'kks/u izfØ;k ,oa fof/;kj
 iz'u i=k fuekZ.k&vkn'kZ iz'u i=k ds fl¼kUr
 lw{e&f'k{k.k&vfHkizk; ,oa dkS'ky&vuq'khyu iz'u dkS'ky] O;k[;k dkS'ky] mn~nhiu ifjorZu]dkS'ky] n`"Vkar O;k[;k dkS'ky] iqucZye dkS'ky

SUGGESTED READING

1. [kUuk] T;ksfr (2009)] fgUnh f'k{k.k] /uirjk; ,.M dEiuh] ubZ fnYyhA
2. 'kekZ] Mh- ds- (1999)] fgUnh f'k{k.k fof/;ka] V.Mu ifCyds'kut] yqf/;kukA
3. jeu fcgkjh yky (1996&97)] fgUnh f'k{k.k] jLrksxh ,.M dEiuh] esjBA
4. 'kekZ] Mh- ,y- (1992), fgUnh f'k{k.k] nso ukxj izdk'ku] t;iqjA
5. HkkfV;k ds-ds- vkSj ukjax] lh- ,y- (1989)] vk/qfud fgUnh fof/;ka] izdk'k czntZ ifCy'kj] yqf/;kukA
6. flUgk izlkn 'k=kqèu (1964)] fgUnh Hkk"kk dh f'k{k.k fof/] fnYyh iqLrd lnu] iVukA
7. izlkn ds'ko (1976)] fgUnh f'k{k.k] /uirjk; ,.M lUl] fnYyhA
8. lQk;k j?kqukFk (1986&97)] fgUnh f'k{k.k fof/] iatkc fdrkc ?kj] tkya/jA
9. lwn fot; (1997)] fgUnh f'k{k.k fof/;kj V.Mu ifCys'ku] yqf/;kukA
10. flag lkfo=kh (1997)] fgUnh f'k{k.k] yk;y cqd fMiks] esjB
11. {kf=k; ds (1968)] ekr`Hkk"kk f'k{k.k] fouksn iqLrd efUnj] vkxjkA
12. thr ;ksxsUnz HkkbZ (1972)] fgUnh f'k{k.k] fouksn iqLrd efUnj] vkxjkA
13. oekZ] oS/ukFk izlkn (1973)] fgUnh f'k{k.k] i¼fr] fcgkj fgUnh xzUFk vdkneh] iVukA
14. t; tloUr flag (1975)] vk/qfud fgUnh f'k{k.k] i¼fr] U;w cqd dEiuh] tkyU/Ja

CURRICULUM AND PEDAGOGIC STUDIES

L	T	P	CR
4	0	0	4

COURSE NAME: PEDAGOGY OF PUNJABI- I

COURSE CODE: EDU377

OBJECTIVES

• ftfdnkoEh nfXnkgeK B{z ਭਾਿਾ, gzikph ਭਾਿਾ ns/ r[ow[yh fbZgh pko/ w[ZYbk frnkB d/Dk.

 wksਭਾਿਾ d/ f;Zfynk d/ ਉਦੇਿਾਰਾਂns/ f;XKsK dh ;'Mh eokT[Dk.

 ਭਾਿਾ j[BoK ns/ fefonktK dh ;[uZih tos'A ns/ nfGnk; eoB ftu ;jkJh j'Dk.

 ;?ezvohਿਰੇਸ਼ਿਆbJh fBoXkfos gzikph gkm ;wZroh ftu'A wjZstg{oB B[efsnK dh u'D eoB ftu ;jkfJsk eoBk.

 gzikphਭਾਿਾ d/ nfXnkgB s/ w[bKeD d/ toswkB gZXo B{z T[u/ok u[ZeD bJh ;koEe ;[Mkn d/Dk.

 ;kfjs d/ ftfGzB o{gK-ejkDh, eftsk, b/y nkfd d/ nfXnkgB YzrK pko/ ikDekoh d/Dk.

• pZfunK nzdo g[;sewkbk ਸ਼ਵਚੋਭਾਿਾ;zpzXh frnkB gqkgs eoB dh o[uh g?dk eoBk.

 gzikph ;kfjs Bkb ;KM T[sgzB eoB bJh ftfdnkoEh nfXnkgeK nzdo gq/oBk g?dk eoBk.

UNIT- I

 ਭਾਿਾdh gqfeqsh ns/ T[sgsh d/ f;XKs.

 gzikphਭਾਿਾdk fBek; s/ ftek;.

 fbgh d/ noE, r[ow[yh fbgh dh gqkuhBsk s/ nB[e{bsk.

 f;Zfynk d/ y/so ftu wks-ਭਾਿਾ dh f;Zfynk d/ T[d/ô ns/ wjZst.

UNIT- II

 ਭਾਿਾ f;Zfynk ftu ;[DB ns/ ;wMD dk wjZst, ;[BD ôesh d/ ftek; Bjhb'VhAd/ nfGnk;.

 p'bukb dh f;Zfynk dk wjZst, nô[ZX T[ukoD d/ ekoB ns/ ;[Xko, w"fye fefonktK (tkoskbkg, tkd-fttkdਭਾਿਾ, ejkDh ;[BkT[Dk).

 gVQBk f;ykT[D dhnK w[Zy ftXhnK ns/ gVQkJh f;Zfynk dhnK fe;wK-;{ywgVQkJh s/ ;p{b gVQkJh (T[Zuh gkm s/ w'B gkm)

 fbyD ebk dk wjZst, fbyDk f;ykT[D dhnK ntZ;EktK, ftXhnK ns/ fbyshezw.

UNIT- III

 eftsk dh f;Zfynk - eftsk gVQkT[D d/ T[d/ô ns/ ftXhnK.

 tkose dh f;Zfynk-ਉਦੇਿns/ ftXhnK.

 ਸ਼ਬਦਾਵਲੀ dh f;Zfynk dhnK ftXhnK, ਮੁਧ i'VK d/ ekoB ns/ ;[Xko.

 ftnkeoD dh f;Zfynk-ftXhnK s/ ਭਾਿਾਈ wjZssk.

 fbyD ebk dk wjZst, fbyDk f;ykT[D dhnK ntZ;EktK, ftXhnK ns/ fbyshezw.

UNIT- IV

 wks-ਭਾਿਾ dh gkm g[;se-wjZst, ਸ਼ਵਿਸੇਿਤਾਵਾਂ ns/ nkb'uBk.

 ਭਾਿਾ g[;sekbk-wjZst s/ gVQB o[uhnK dk ftek;.

 ਸ਼ਦਰਿਟੀ-;q's ;jkfJe ;kXB, fe;wK s/ gq:'rh wjZst.

 ਭਾਿਾ:'rsktK dk w[bKeD-nkX[fBe XkoBk, wjZst, gqhfynk ns/ w[bKeD ftu

 coe, w[bKeD d/ ;kXB ns/ □ਰਸ਼ਾ dhnK fe;wK.

 gkm :'iBk-ਉਦੇਿਾਰ ns/ fsnkoh (eftsk, ejkDh, fBpzX, ftnkeoD, tkose)

 ਭਾਿਾf;Zfynk dk nfXnkge.

SUGGESTED READINGS

1. gzikphਭਾਿਾ ftnkeoD ns/ pDso L gzikph :{Bhtof;Nh, gfNnkbk.
2. gzikphôpd o{g ns/ ôpd i'V e'ô L vka joehos f;zx.
3. wks-Gkôk dh f;Zfynk ftXh L vka i;tzs f;zx i;.
4. gzikphਭਾਿਾ s/ ;kfjs nfXnkge L vka fJzdod/t f;zx Bzdok.

5. gzikph ;kfjs dh T[sgsh ns/ ftek; - feogkb f;zx e;/b, gofwzdo f;zx, r'fpzd f;zx bKpk bkj"o p[Ze ôkg, b[fXnkDk.
6. wZXekb dh u'Dt] gzikph eftsk - vkH gqhsw f;zx (;zgkH) gpbhe/ôB fpT{o', uzvhrVQ.
7. gzikph nfXn?B d/ w[Yb/ ;zebg - ihs f;zx i'ôh, tko; ôkj ckT{Av/ôB, nzfwqs;o - 1999
8. gzikph Gkôk fbgh ns/ ftnkeoB-vkH ôod/t f;zx frZb b'erhs gqekôB, 2006

CURRICULUM AND PEDAGOGIC STUDIES

L	T	P	CR
4	0	0	4

COURSE NAME: PEDAGOGY OF MATHEMATICS- I

COURSE CODE: EDU379

OBJECTIVES:

- To develop an understanding of the nature and values of mathematics.
- To appreciate the contribution of various mathematicians.
- To acquire knowledge of pedagogical analysis of various concepts in mathematics.
- To practice the various methods and techniques of teaching mathematics.
- To develop an understanding of various approaches of organizing the curriculum.
- To develop an understanding of preparation and use of diagnostic test and organize remedial teaching catering to the individual differences.
- To develop the skill of conducting recreational activities of mathematics.
- To know the importance of teaching mathematics in relation to other subjects
- To formulate the general instructional objectives and specific learning outcomes
- To acquire competence in teaching mathematics and structuring lesson plans

COURSE CONTENT

UNIT- I NATURE AND SCOPE OF MATHEMATICS

- Nature of concepts, concept formation and concept assimilation, moves in teaching a concept—defining, stating necessary and/or sufficient condition, giving examples accompanied by a reason, comparing and contrasting; giving counter examples; Non examples;
- Planning and implementation of strategies for teaching a mathematical concept like Activity based method, Inductive-deductive method etc.; Problem posing and solving, discovering or exploring various options for solving the problems;
- formulation of conjecture and generalizations through several illustrations;
- Difference between teaching of mathematics and teaching of science.

UNIT- II EXPLORING LEARNERS

- Cultivating learner's sensitivity like intuition; encouraging learner for- probing,
- raising queries and relating mathematics to real life situations;
- appreciating dialogue and cooperative learning among peer group;
- promoting the student's confidence (carrying out examples from various mathematical content areas, such as Number Systems, Geometry, Sets, etc.).

UNIT- III AIMS AND OBJECTIVES OF TEACHING SCHOOL MATHEMATICS

- Need for establishing general objectives for teaching mathematics;
- Study of the aims and general objectives of teaching mathematics vis-a-vis the objectives of school education;
- writing learning objectives and teaching points of various content areas in mathematics like Algebra, Geometry, Trigonometry, etc.

UNIT- IV SCHOOL MATHEMATICS CURRICULUM AND APPROACHES AND STRATEGIES IN TEACHING AND LEARNING OF MATHEMATICAL CONCEPTS

- Objectives of curriculum, principles for designing curriculum, designing curriculum at different stages of schooling,
- some highlights of curriculum like vision of school mathematics, main goal of mathematics education,
- core areas of concern in school mathematics, curricular choices at different stages of school mathematics education,
- construction of syllabi in various disciplines of mathematics, for example, Algebra, Geometry, etc.; Pedagogical analysis of various topics in mathematics at

  various levels of schooling—Arithmetic (Development of Number Systems), Algebra, Trigonometry, Statistics and Probability, etc.

INDIVIDUALIZED SESSIONAL WORK: It will include the following activities:

1. Development of lesson plan in mathematics.
2. Student teachers will be asked to submit a teaching aid useful in the teaching of mathematics.

SUGGESTED READINGS

1. Aggarwal, J. C. (2008). Teaching of Mathematics. New Delhi: Vikas Publishing House Pvt Ltd.
2. Bagyanathan, D. (2007). Teaching of Mathematics. Chennai: Tamil Nadu Text Book Society.
3. Bishop, G. D. (1965). Teaching Mathematics in the Secondary School. London: Collins Publication.
4. Bolt, B., & Hobbs, D. (2005). 101 Mathematical Projects. New Delhi: Cambridge University Press.
5. Butter, C. H., & Wren, F. L. (1965). The Teaching of Secondary Mathematics. London Graw Hill Book Company.
6. Dececco, J. P., & Crawford, W. (1977). The Psychology of Learning and Instruction. New Delhi: Prentice Hall of India Private Ltd.
7. Ediger, M., & Bhaskara Rao, D. B. (2004). Teaching Mathematics Successfully. New Delhi: Discovery Publishing House.
8. Ediger, M., & Rao, D.B. (2000). Teaching Mathematics Successfully. New Delhi: Discovery Publishing House.
9. Goel, Amit. (2006). Learn and Tteach Mathematics. New Delhi: Authors Press.
10. Hoglum, L. (1967). Mathematics for the Million. London: Pan Books Limited.
11. ICFAI. (2004). Methodology of Teaching Mathematics. Hyderabad: ICFAI University Press.
12. Iyengar, K. N. (1964). The Teaching of Mathematics. New Delhi: A Universal Publication.
13. Kapoor, S. K. (2006). The Teaching of Vedic Mathematics. New Delhi: Lotus Press.
14. Kulshreshtha, A. K. (2008). Teaching of Mathematics. Meerut: R. Lall Books Depot.
15. Land, F. W. (1966). New Approaches to Mathematics Teaching. New Delhi: Mac Millan, St. Martin's press.
16. Reymond, B. (2000). Math-tricks, Puzzles and Games. New Delhi: Orient Paperbacks.
17. Sakuntala, D. (1999). More Puzzles. New Delhi: Orient Paperbacks.
18. Schwartz, S. L. (2007). Teaching Young Children Mathematics. London: AtlanticPublishers & Distributors (P) Ltd.
19. Sharan, R., & Sharma, M. (2006). Teaching of Mathematics. New Delhi: A.P.H. Publishing Corporation.
20. Sharma, R. A. (2008). Technological foundation of education. Meerut: R. Lall Books Depot
21. Siddiqui, M. H. (2005). Teaching of Mathematics. New Delhi: A.P.H. Publishing Corporation.
22. Sidhu, K. S. (2006). The Teaching of Mathematics. New Delhi: Sterling Publishers private ltd.

23. Singh, M. (2006). Modern Teaching of Mathematics. New Delhi: Anmol Publications Pvt. Ltd.

CURRICULUM AND PEDAGOGIC STUDIES

L	T	P	CR
4	0	0	4

COURSE NAME: PEDAGOGY OF BIOLOGICAL SCIENCE- I

COURSE CODE: EDU381

OBJECTIVES: The course will enable the student teachers to -

- Facilitate inculcation of scientific attitude and temper among learner
- Appreciate that biological science is a dynamic and expanding body of knowledge
- Nurture curiosity of learners about her/his natural surroundings and relationships of every day's experience with concepts of biological sciences
- Develop insight about nature of biological sciences and for determining strategies of teaching-learning
- Explore different ways to create learning situations for different concepts of biological sciences and for learners of different abilities
- Effectively use different activities/experiments and laboratory experiments for teaching- learning of biological sciences
- Formulate appropriate and meaningful inquiry episodes, problem-solving situations and investigatory projects based on upper primary, secondary and higher secondary curriculum
- Examine and priorities different pedagogical issues in biological science
- Develop appropriate assessment tools for the evaluation of learning of different concepts of biological sciences
- Develop linkage of different concepts of biological sciences with life skills and its development
- Stimulate curiosity, creativity and inventiveness in the field of biological sciences

UNIT- I NATURE AND SCOPE OF SCIENCE AND BIOLOGY

- Science as a domain of inquiry and exploration; A continuously evolving discipline with focus on processes for understanding of concepts leading to knowledge and application with reference to living organisms, their surroundings, processes and phenomena.
- Scope of Biological Science for understanding the diversity of the living world, origin of life and its evolution, environment, health, sustenance of the ecosystem vis-à-vis values and ethics.
- Significance of inquiry, observation and experiments in biological science, its interdisciplinary linkages and societal concerns.
- History of biological sciences

UNIT- II AIMS AND OBJECTIVES

- Development of scientific attitude and temper and nurturance of curiosity, creativity and value□□Curricular concerns and its development with reference to biological sciences; Content selection and its organization; Understanding of facts, principles and its application biological principles with cognitive abilities and development of learners.
- Acquiring skills to understand processes of studying biology e.g. observation, exploration, experiments etc. Generalizations of observations and validation of knowledge.
- Problem solving relating to biological sciences. Relationship of biology education with environment and its sustenance.

UNIT- III EXPLORING LEARNERS

- Linkage of learners previous understanding (classroom, environment, society and peer group) and knowledge in the area of biology.

- Cultivating habit of listening ideas of learners and involving them in the process of teaching- learning, setting dialogue and discussion among peer groups, involving them in activities in individual and group set-up.
- Important discoveries and inventions in the area of Biology and its impact on the curriculum
- Stimulation of creativity and inventiveness in the area of biological science among learners
- Organization of activities in the area of biological sciences like discussion, debate, drama and various other curricular experiences (poster making, essays, slogans, etc.), observing specific days involving learners
- Nurturance of creative talents among learners through activities in various club activities in the area of Science, preparing learners for Science Exhibitions, Fairs and other gatherings at local/districts/state and national level

UNIT- IV PEDAGOGICAL SHIFT IN BIOLOGICAL SCIENCE, APPROACHES AND STRATEGIES OF LEARNING BIOLOGY

- Pedagogical shift from science as a fixed body of knowledge to the process of constructing knowledge; Pedagogical shift in nature of science, knowledge, learners, learning and teachers, assessment, science curriculum and planning teaching -learning experiences (taking examples from science/ Biology, such as Photosynthesis, Life Processes, Diversity in Living Organisms, Biotechnology etc.)
- Democratising Science learning: Critical pedagogy
- Need of inclusion in all aspects of teaching-learning of biological science –science curriculum, approaches, ICT and professional development of teachers.
- Process of learning through observation, inquiry, hypothesis, experimentation, data collection, interpretation and generalization (taking suitable example from living world and related areas in an age as well as stage appropriate manner).
- Approaches and strategies of learning Biology: Expository approach, investigation, projects, peer interactions, collaborative approach, experiential learning, concept mapping and self-learning, etc., designing learning experiences with all these approaches.

CURRICULUM AND PEDAGOGIC STUDIES

L	T	P	CR
4	0	0	4

COURSE NAME: PEDAGOGY OF PHYSICAL SCIENCE- I

COURSE CODE: EDU383

UNIT- I NATURE OF SCIENCE

- Science as a domain of inquiry, as a dynamic and expanding body of knowledge, science as interdisciplinary area of learning (e.g., Thermodynamics, Biomolecules Surface Chemistry, etc.),
- Science as a process of constructing knowledge; Scientific methods: a critical view, How science works; Role of science teacher.
- Science and society- Physical science and society; physical science for environment, health, peace and equity.
- Contribution of eminent scientists- Isaac Newton, John Dalton, J.C. Bose, Albert Einstein Niels Bohr, C.V. Raman, V. Ramakrishan, etc.

UNIT- II AIMS AND LEARNING OBJECTIVES OF PHYSICAL SCIENCE

- Knowledge and understanding through science; Nurturing process skills of science, developing scientific attitude and scientific temper.
- Nurturing curiosity, creativity and aesthetic sense in science (Secondary Stage)/Physics and Chemistry (Higher Secondary stage).
- Relating Science (Physics/ Chemistry) education to environment (natural environment, artifacts and people), technology and society and appreciating the issues at the interface of science, technology and society; imbibing

various values through teaching –learning of Science; Developing problem solving skills.

- Identifying and writing learning objectivities for different content areas in Science/ Physics/ Chemistry consistent with the cognitive development of learners (e.g., Mechanics, Heat, Electricity, magnetism, Light, Acids, Bases and Salts, Thermodynamics, Metallurgy, Physical and Chemical changes, Nature and state of Matter, etc.); Learning objectives in constructivist perspective.

UNIT- III EXPLORING LEARNERS

- Each learner in unique; Motivating them to being his/her previous knowledge gained in Science/ Physics and Chemistry into classroom; Naive concepts, Involving learners n teaching- learning process through dialogue, discussion, argumentation.
- Negotiating and mediating learning in Physical Science; Encouraging learners to raise and ask questions, creating the habit of listening to learners; Encouraging learners to collect materials from local resources (soil, water, etc.) and to develop/fabricate activities in Science/Physics/Chemistry.

UNIT- IV SCHOOL SCIENCE CURRICULUM AND PEDAGOGICAL SHIFT AND APPROACHED AND STRATEGIES OF LEARNING PHYSICAL SCIENCE

- From subject-centered to behaviorist to constructivist approach to curriculum development; Review of NCERT and a state syllabus; recommendations of NCFson science curriculum.
- Trends of NCERT syllabi; Moving from textbooks to teaching-learning materials; Teacher as a curriculum developer.
- Pedagogical shift from science as a fixed body of knowledge to the process of constructing knowledge; Pedagogical shift in nature of science, knowledge, learners, learning and teachers, assessment, science curriculum and planning teaching -learning experiences (taking examples from science/ Physics/Chemistry, such as Solutions, Chemical Equilibrium, Electrochemistry, Mechanical and Thermal Properties of Matter, Reflection, Refractions, Waves optics, etc.)
- Democratising Science learning: Critical pedagogy
- Need of inclusion in all aspects of teaching- learning of physical sciences –science curriculum, approaches, ICT and professional development of teachers.
- Approaches and Strategies- Science; Essential components of all approached and strategies, selecting appropriate approach and strategy.
- Constructivist approach; Collaborative learning approach, Problem solving approach; Concept mapping; Experiential learning;

FIELD ENGAGEMENT/ INTERNSHIP/ DEVELOPING CRITICAL SKILLS

COURSE NAME: OBSERVING PTM AND PARTICIPATING IN PTM

L	T	P	CR
0	0	1	1

COURSE CODE: EDU391

Duration: 1 Week

Note: Field engagement will be done in consultation with the higher authority and with the consent of the schools. All the types of observational records will be considered:
Field notes and Running records

Each pupil teacher will prepare a report and will submit it to the concerned teacher. This report will be evaluated and grades will be awarded.

Semester- VI

COURSE	COMPONENT	NATURE	COURSE CODE	COURSE NAME	DISTRIBUTION OF HOURS			TOTAL CREDITS
					LECTURE	TUTORIAL	PRACTICAL	
1	Discipline Specific Electives	Compulsory	EDU302	Chemistry	**4**	**0**	**0**	**4**
2	Discipline Specific Electives	Compulsory	EDU304	Chemistry Practical	**0**	**0**	**3**	**2**
3	Discipline Specific Electives	Compulsory	EDU306/ EDU314	Botany/Physics	**4**	**0**	**0**	**4**
4	Discipline Specific Electives	Compulsory	EDU308/ EDU316	Botany Practical/ Physics Practical	**0**	**0**	**3**	**2**
5	Discipline Specific Electives	Compulsory	EDU346/ EDU310	Mathematics/ Zoology	**6/4**	**0**	**0**	**6/4**
6	Discipline Specific Electives	Compulsory	EDU312	Zoology Practical	**0**	**0**	**3**	**2**
7	Skill Enhancement Course	Compulsory	EDU332	Understanding Self and Personality Development	**4**	**0**	**0**	**4**
8	Curriculum and Pedagogic Studies	Compulsory	EDU380/ EDU382/	Pedagogy of Mathematics- II/ Pedagogy of Biological Science- II/	**4**	**0**	**0**	**4**
9	Curriculum and Pedagogic Studies	Compulsory	EDU384	Pedagogy of Physical Science- II	**4**	**0**	**0**	**4**
10	Field Engagement/ Internship/ Developing Critical Skills	Compulsory	EDU392	Pre- Internship	**0**	**0**	**4**	**4**
GRAND TOTAL								**36**

DISCIPLINE SPECIFIC ELECTIVE (CHEMISTRY)

	L	T	P	CR
COURSE NAME: ORGANIC CHEMISTRY-II COURSE CODE: EDU302	**4**	**0**	**0**	**4**

OBJECTIVES:

This course is intended to learn the basic concepts of Organic Chemistry. The various topics of the syllabus are grouped under different units in order to bring forth importance of academic and laboratory skills for the undergraduate students.

COURSE CONTENT

UNIT- I ALCOHOLS, PHENOLS, ETHERS AND EPOXIDES

- *Alcohols:* preparation, properties and relative reactivity of 1°, 2°, 3° alcohols, Bouvaelt-Blanc Reduction; Preparation and properties of glycols: Oxidation by periodic acid and lead tetraacetate, Pinacol-Pinacolone rearrangement;
- *Phenols:* Preparation and properties; Acidity and factors effecting it, Ring substitution reactions, Reimer–Tiemann and Kolbe 's–Schmidt Reactions, Fries and Claisen rearrangements with mechanism;
- *Ethers and Epoxides:* Preparation and reactions with acids. Reactions of epoxides with alcohols, ammonia derivatives and $LiAlH_4$

UNIT- II CARBONYL COMPOUNDS

- Structure, reactivity and preparation;
- Nucleophilic additions, Nucleophilic addition-elimination reactions with ammonia derivatives with mechanism; Mechanisms of Aldol and Benzoin condensation, Cannizzaro and Wittig reaction, α haloform reaction and Baeyer Villiger oxidation, oxidations and reductions (Clemmensen, Wolff-Kishner, $LiAlH_4$, NaBH4)

UNIT- III CARBOXYLIC ACIDS AND THEIR DERIVATIVES

- Preparation and reactions of acid chlorides, anhydrides, esters and amides; Comparative study of nucleophilic substitution at acyl group -Mechanism of acidic and alkaline hydrolysis of esters, Claisen condensation, Dieckmann and Reformatsky reactions, Hofmann-bromamide degradation and Curtius rearrangement.

UNIT- IV NITROGEN CONTAINING FUNCTIONAL GROUPS

- Preparation and important reactions of nitro and compounds, reduction of nitroarenes in acidic, neutral and alkaline media. nitriles and isonitriles
- Amines: Effect of substituent and solvent on basicity; Preparation and properties: Gabriel phthalimide synthesis, Carbylamine reaction, Mannich reaction, Hoffmann 's exhaustive methylation, Hofmann-elimination reaction; Distinction between 1°, 2° and 3° amines with Hinsberg reagent and nitrous acid. Amine salts as phase – transfer catalysts, electrophilic aromatic substitution in aryl amines, reactions of amines with nitrous acid.
- Diazonium Salts: Preparation and their synthetic applications.
- Preparation of five membered heterocycles – furan, thiophene and pyrrole (Paal-Knorr synthesis). Aomatic characteristics of pyrrole, furan, thiophene and their chemical reactions with particular emphasis on the mechanism of electrophilic substitution

SUGGESTED READINGS

1. Morrison, R. T. & Boyd, R. N. *Organic Chemistry*, Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
2. Finar, I. L. *Organic Chemistry* (*Volume 1*), Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
3. Graham Solomons, T.W. *Organic Chemistry,* John Wiley & Sons, Inc.

DISCIPLINE SPECIFIC ELECTIVE (CHEMISTRY)

L	T	P	CR
0	0	3	2

COURSE NAME: ORGANIC CHEMISTRY-II PRACTICAL

COURSE CODE: EDU304

INDIVIDUALIZED SESSIONAL WORK: It will include the following activities:

1. Acetylation of one of the following compounds: amines (aniline, *o*-, *m*-, *p*-toluidines and *o*-, *m*-, *p*-anisidine) β and phenols (- naphthol, vanillin, salicylic acid)
2. Benzolyation of one of the following amines (aniline, *o*-, *m*-, *p*- toluidines and *o*-, *m*-, *p*-anisidine) and β one of the following phenols (-naphthol, resorcinol, p-cresol) by Schotten-Baumann reaction.
3. Oxidation of ethanol/ isopropanol (Iodoform reaction).
4. Bromination of Acetanilide
5. Nitration of Acetanilide/nitrobenzene
6. Hydrolysis of amides and esters.
7. Semicarbazone of any one of the following compounds: acetone, ethyl methyl ketone, cyclohexanone, benzaldehyde.
8. Aldol condensation
9. Isolation of caffeine from tea leaves
10. Cannizzaro reaction
11. Preparation of oil of Wintergreen from commercial aspirin tablets

DISCIPLINE SPECIFIC ELECTIVE (BOTANY)

L	T	P	CR
4	0	0	4

COURSE NAME: ECOLOGY AND UTILIZATION OF PLANTS

COURSE CODE: EDU306

COURSE CONTENT UNIT-I

- Definition, scope, relationship with other sciences.
- **Plant Environment**: Climatic, edaphic, topographic and biotic factors affecting growth and distribution of plants.
- **Ecosystem**: Concept, structure; abiotic and biotic components; trophic levels, food chain, food web, ecological pyramids, energy flow, biogeochemical cycles of carbon, nitrogen and water.

UNIT-II

- **Community Ecology**: Community characteristics, frequency, density cover, life forms, biological spectrum; ecological succession – Hydrosere and Xerosere.

- **Applied Ecology**: (a) Air, water and soil pollution and their control. (b) Conservation and management of natural resources (renewable and non-renewable)

UNIT-III

- **Crop Production**: Area of cultivation, soil requirement, cultivation practices and high yielding varieties of: Cereals (Wheat, Rice and Maize); Fibres (Cotton); Vegetables (Potato); Fruits (Mango, Grapes, Lemon); Sugar-yielding plants (Sugarcane); Oil-yielding plants (Groundnut, Mustard); Brief introduction on genetically modified crops.

UNIT-IV

- Elementary Knowledge of the following plants (Botanical names, families, part used and economic importance): Wheat, Maize, Rice, Moong, Gram (Food); Teak, Shisham, Deodar, Sal (Timbers); Cotton, Jute, Coir, Flax (Fibres); Fennel, Coriander, Turmeric, Ginger, Mint, Clove (Spices and Condiments); Bamboo, Eucalyptus (Pulp plants); Liquorice, Belladona, Aconite, Ashwagandha, Arjun, Poppy, Amla (Medicinal plants); Tea and Coffee (Beverages).
- Forestry: Forest conservation, wood seasoning and its preservation.

SUGGESTED READINGS

1. Kochhar, S.L. Economic Botany in Tropics, 2nd Edition, Macmillan India Ltd., New Delhi, 1998.
2. Kormondy, E.J.: Concepts of Ecology, Prentice-Hall of India Pvt. Ltd., New Delhi, 1996.
3. Odum, E.P.: Basic Ecology, Saunders, Philadelphia, 1983.
4. Sambamurthy, A.V.S.S. and Subramanian, N.S.: A Textbook of Economic Botany, Wiley Eastern Ltd., New Delhi, 1989.
5. Sharma, O.P.: Hill 's Economic Botany (Late Dr. A.F. Hill, Adapted by O.P. Sharma), Tata McGraw Hill Co. Ltd., New Delhi, 1996.
6. Simpson, B.B. and Conner-Oghorzaly, M.: Economic Botany – Plants in Our World, McGraw Hill, New York, 1986.

DISCIPLINE SPECIFIC ELECTIVE (BOTANY)

L	T	P	CR
0	0	3	2

COURSE NAME: ECOLOGY AND UTILIZATION OF PLANTS PRACTICAL

COURSE CODE: EDU308

INDIVIDUALIZED SESSIONAL WORK: It will include the following activities:

1. Study of ecological adaptations in external characters of:
2. Hydrilla, Potamogeton, Ceratophyllum, Vallisneria, Lemna, Eichhornia, Nelumbium, Calotropis,
3. Nerium, Acacia, Zizyphus, Casuarina, Capparis, Asparagus, Ruscus, Opuntia, Euphorbia royleana.
4. Identification and morphology of economically important part/s of crop plants mentioned below: Cereals (wheat, rice); Fibres (cotton); Vegetables (potato); Fruits (mango, grapes, lemon); sugar yielding plants (sugarcane) and oil-yielding plants (groundnut, mustard).
5. To determine soil pH using pH paper/solution/pH meter.
6. To determine water holding capacity of soil.

DISCIPLINE SPECIFIC ELECTIVE (ZOOLOGY)

L	T	P	CR
4	0	0	4

COURSE NAME: DEVELOPMENTAL BIOLOGY

COURSE CODE: EDU310

COURSE CONTENT UNIT- I

Introduction: Historical perspective and basic concepts: Phases of development, Cell-Cell interaction, Pattern formation, Differentiation and growth, Differential gene expression, Cytoplasmic determinants and asymmetric cell division.

UNIT- II

Early Embryonic Development: Gametogenesis, Spermatogenesis, Oogenesis; Types of eggs, Egg membranes; Fertilization (External and Internal): Changes in gametes, blocks to polysomy; Planes and patterns of cleavage; Types of Blastula; Fate maps (including Techniques); Early development of frog and chick up to gastrulation; Embryonic induction and organizers.

UNIT- III

Late Embryonic Development: Fate of Germ Layers; Extra- embryonic membranes in birds; Implantation of embryo in humans, Placenta (Structure, types and functions of placenta)

Post Embryonic Development: Metamorphosis-Changes, hormonal regulations in amphibians and insects; Regeneration-Modes of regeneration, epimorphosis, morphallaxis and compensatory regeneration (with one example each); Ageing-Concepts and Theories

UNIT- IV

Implications of Developmental Biology: Teratogens: Teratogenic agents and their effects on embryonic development; *In vitro* fertilization, Stem cell (ESC), Amniocentesis.

SUGGESTED READINGS

1. Balinsky B. I. and Fabian B. C. *An Introduction to Embryology*, V Edition, International Thompson Computer Press, 1981.
2. Carlson, R. F. *Patten's Foundations of Embryology*
3. Gilbert, S. F. *Developmental Biology*, IX Edition, Sinauer Associates, Inc., Publishers, Sunderland, Massachusetts, USA, 2010.
4. Kalthoff.*Analysis of Biological Development*, II Edition, McGraw-Hill Publishers, 2008.
5. Lewis Wolpert. *Principles of Development*. II Edition, Oxford University Press, 2002.
6. Hafez, E. S. E. *Reproduction in Farm Animals*, Lea and Fabiger Publishers, 1962.
7. Prost, P. J. *Apiculture.* Oxford and IBH, New Delhi, 1962.
8. *Sericulture*. FAO Manual of Sericulture.
9. Singh, S. *Beekeeping in India*. Indian council of Agricultural Research, NewDelhi.
10. Srivastava, C. B. L. *Fishery Science and Indian* Fisheries. Kitab Mahal Publications, India, 1999.
11. Developmental Biology by K.V. Sastry & Vinita Shukla – (Rastogi Publications, 2008).
12. Introduction to Embryology by B.I. Balinsky – (W.B. Saunders, Philadelphia, 1976).

13. Foundations of Embryology by B.M Paten and B.M. Carison.
14. Foundations of Animal Development by A.F. Hopper and N.H. Hart (Oxford University Press, New York, 1980).
15. Vertebrate Embryology by R.S. McEwen (Oxford & IBM Publishing CO., New Delhi).
16. A Hand Book of Sericulture by Iyonemura & M.N. Rama Rao.
17. C.S.I.R. Wealth of India (Supplement) on Fish and Fisheries. (CSIR, New Delhi).
18. Bee keeping by J.E. Eckert and F.R. Shaw.
19. Developmental Biology by J.W. Brookbank.
20. Patterns and Principles of Animal Development by J.W. Saunders. Jr.
21. Fish and Fisheries of India by V.G. Jhingran (Hindustan Publishing Corpn; New Delhi)
22. Economic Zoology by G.S. Shukla & V.B. Upadhyay
23. Embryology by Barth IG (1966) – Holt Rinehart & Winston.
24. Development by Berril N & Karp G (1978) – Tata McGraw Hill Publ. Co.
25. Modern Embryology by Bodemer CW (1960) - Holt Rinehart & Winston.
26. Fundamentals of Comparative Embryology of Vertebrates by Huettner AF (1967) – McMillan Co.
27. Chordate Embryology by Mohan Arora (1985) – Atma Ram & Sons.
28. Laboratory manual of Vertebrate Embryology by Rugh R – Allied Pacific Pvt. Ltd.
29. Chordate Embryology by Verma PS & Agarwal VK – Chand & Co
30. Gilbert, S. F. (2006). Developmental Biology, VIII Edition, Sinauer Associates, Inc., Publishers, Sunderland, Massachusetts, USA.
31. Balinsky, B.I. (2008). An introduction to Embryology, International Thomson Computer Press.
32. Kalthoff, (2000). Analysis of Biological Development, II Edition, McGraw-Hill Professional

DISCIPLINE SPECIFIC ELECTIVE (ZOOLOGY)

L	T	P	CR
0	0	3	2

COURSE NAME: DEVELOPMENTAL BIOLOGY PRACTICAL
COURSE CODE: EDU312
INDIVIDUALIZED SESSIONAL WORK: It will include the following activities:

1. The following practical will be conducted using charts/models/e-resources.
2. Study of whole mounts and sections of developmental stages of frog: Cleavage stages, blastula, gastrula, neurula, tail - bud stage, tadpole (external and internal gill stages)
3. Study of whole mounts of developmental stages of chick: Primitive streak (13 and 18 hours), 21, 24, 28, 33, 36, 48, 72, and 96 hours of incubation (Hamilton and Hamburger stages)
4. Study of the developmental stages and life cycle of *Drosophila*
5. Study of different sections of placenta
6. Project report on *Drosophila* culture/chick embryo

DISCIPLINE SPECIFIC ELECTIVE (PHYSICS)

L	T	P	CR
4	0	0	4

COURSE NAME: NUCLEAR PHYSICS
COURSE CODE: EDU314
COURSE CONTENT
UNIT- I NUCLEAR PROPERTIES

- Historical overview of nuclear physics, Constituents of nucleus, non-existence of electrons in nucleus, Nuclear charge and mass, nuclear radius, spin, parity, angular momentum, magnetic moment, electric quadrupole moment, binding energy, binding energy per nucleon and its observed variation with mass number of the nucleus, explanation of the binding energy curve, qualitative discussion of two-body nuclear forces.

UNIT- II RADIOACTIVE DECAYS

- Radioactive decay law, decay constant and half-life; methods of measurement of half-life, Type of decays, Natural radioactivity, chart of nuclides and domain of instabilities, radioactive dating, units for measuring radiations, constituents of Cosmic rays. Beta decays - capture decays, Fermi 's theory, angular momentum and parity selection rules, neutrino and antineutrino, parity violation in -decay and its experimental verification. Alpha decay: Stability of heavy nuclei against break up, Geiger-Nuttal law, Gamow's explanation, angular momentum and parity in decay, energy release in alpha decay. Gamma transitions: Excited levels, isomeric levels, gamma transitions, multipole moments, selection rules, transition probabilities, internal conversion**.**

UNIT- III NUCLEAR REACTIONS AND NUCLEAR MODELS

- Rutherford 's experiment of nuclear transmutation, Types of nuclear reactions, reactions cross section, conservation laws, Kinematics of nuclear reaction, Q-value and its physical significance. Nuclear fission, neutron reactions, Fermi and transuranic elements, chain reactions, Nuclear reactor, reactor criticality, moderators. Liquid drop model, semi-empirical mass formula, condition of stability, evidence for nuclear magic numbers.

UNIT- IVINTERACTION AND DETECTION OF RADIATION

- Energy loss of electrons and positrons, Positron annihilation in condensed media, Stopping power and range of heavier charged particles, interaction of gamma rays with matter: Basis of detection of nuclear radiations, Gas-filled detectors, proportional and Geiger-Muller counters, Scintillation detectors, solid-state detectors, solid state nuclear track detectors.

SUGGESTED READINGS

1. W. E. Burcham, and M. Jobes, Nuclear and Particle Physics, United Kingdom: Pearson 1995.
2. V. K. Mittal, R. C. Verma, and S.C. Gupta, Introduction to Nuclear and Particle Physics. New Delhi: Prentice Hall of India, 2013.
3. K. S. Krane Introductory Nuclear Physics, John Wiley & Sons, 1988.
4. K. Hyde, Basic Ideas and Concepts in Nuclear Physics United Kingdom: Institute of Physics 2004.
5. H. Enge, Introduction to Nuclear Physics, London: Addison-Wesley 1971.
6. I. Kaplan Nuclear Physics, New Delhi: Narosa 2002

DISCIPLINE SPECIFIC ELECTIVE (PHYSICS)

L	T	P	CR
0	0	4	2

COURSE NAME: NUCLEAR PHYSICS PRACTICAL
COURSE CODE: EDU316
INDIVIDUALIZED SESSIONAL WORK: It will include the following activities:

1. Study the background radiation levels using Radiation meter
2. Characteristics of Geiger Muller (GM) Counter
3. Study of characteristics of GM tube and determination of operating voltage and plateau length using background radiation as source (without commercial source).
4. Study of counting statistics using background radiation using GM counter.
5. Study of radiation in various materials (e.g., KSO4 etc.). Investigation of possible radiation in
6. Different routine materials by operating GM at operating voltage.
7. Study of absorption of beta particles in Aluminum using GM counter.
8. Detection of α particles using reference source & determining its half-life using spark counter.
9. Gamma spectrum of Gas Light mantle (Source of Thorium).

DISCIPLINE SPECIFIC ELECTIVE (MATHEMATICS)

L	T	P	CR
6	0	0	6

COURSE NAME: ABSTRACT ALGEBRA
COURSE CODE: EDU346
OBJECTIVES: The students will be able to:

- Explain various Groups and Theorems.
- Discuss Rings, Subrings in details like Gaussian and Polynomial Rings.
- Define and Exemplifiers Vector Spaces, Subspaces of various types along with the related theorems.
- Discuss Linear Transformation, Linear Maps, and Matrices.
- Discuss Characteristics Roots and Vectors and variety of matrices.

COURSE CONTENT UNIT- I

- Groups, subgroups, Cosets, Lagrange's Theorem, Normal (subgroups and Quotient groups. Simple groups, Homomorphism, Isomorphism theorems and Automorphisms, Counting principle. Cayley's theorem, Permutation groups, Alternating groups, Conjugacy, Class equation

UNIT- II

- Rings, Subrings. Integral domains, characteristics of a ring and a field, Ideals, Prime and Maximal ideals, Homomorphism, Quotient rings, Integral domains. Field of quotients of an Integral domain, Euclidean domains. The ring of Gaussian Integers, Polynomials rings over rings and fields

UNIT- III

- Definition and examples of vector spaces, subspaces, sum and direct sum of subspaces. Linear span, linear dependence, independence and their basic properties, Basis, Finitely generated vector spaces, Existence theorem for basic dimensional vector space, Invariance of the number of elements of a basis set, dimension, Existence of complementary subspace of a finite dimensional vector space, dimension of sums of subspaces

UNIT- IV

- Linear transformations, algebra of linear transformations, rank and nullity of a linear map, inverse of a linear transformation, the space L (u, v), composition of linear maps, matrix associated with a linear map, linear map associated with a matrix, Dimensions of matrix. Rank and nullity of a matrix
- Characteristic roots and characteristic vectors, of a matrix, nature of characteristic roots of special types of matrices, relation between algebraic and geometric multiplicities of a characteristic root. Minimal polynomial of a matrix, orthogonal reduction of real symmetric matrices, unitary reduction of Hermitian matrices, similarity of matrices, diagonalization of matrices.

INDIVIDUALIZED SESSIONAL WORK: It will include the following activities:

1. Make a study on Abstract Algebra for high school teachers: an experiment with learning group.
2. Project based on The Future of the Teaching and Learning of Algebra.

3. Study of describing connections between Abstract Algebra and secondary Education.

SUGGESTED READINGS

1. Herstein, I.N. (2007), Topics in Algebra. 2nd Editions, Wiley Eastern Ltd., New Delhi.
2. Artin, M. (1994), Algebra. Prentice Hall of India, New Delhi.
3. Gillian, J.A. (2000), Contemporary Abstract Algebra. Narosa Publishing House, New Delhi.
4. Singh, S. & Zameeruddin, Q. (2000), Modern Algebra. 7th Edition, Vikas Publishing House, New Delhi.
5. Datta, K.B. (2007), Matrix and Linear Algebra. Prentice Hall of India Pvt. Ltd., New Delhi.
6. Hoffman, K. & Kunze, R. (2006), Linear Algebra. 2nd Edition, Prentice Hall of India Pvt Ltd, New Delhi.
7. Krishnamurthy, V., Mainra, V.P. & Arora, J.L. (2006), An Introduction to Linear Algebra. East West Press, New Delhi.
8. Narayan, S. & Mittal, P.K. (2007), A Text Book of Matrices. 10th Edition, S. Chand & Co, New Delhi.

SKILL ENHANCEMENT COURSE

COURSE NAME: UNDERSTANDING SELF AND PERSONALITY

L	T	P	CR
4	0	0	4

COURSE CODE: EDU332

OBJECTIVES: The course will enable the student teachers to:

- Gain an understanding of the central concepts in defining _self and _identity.
- Reflect critically on factors that shape the understanding of _self.
- Build an understanding about themselves, i.e., the development of self as a person as well as a teacher.
- Reflect on one's experiences, aspirations and efforts towards becoming a humane individual and teacher.
- Develop effective communication skills including the ability to listen, observe etc.
- 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.
- Appreciate the critical role of teachers in promoting _self and students w e11-being.

UNIT- I UNDERSTANDING OF SELF

- Reflections and critical analysis of one's own self and identity
- Identifying factors in the development of self and in shaping identity
- Building an understanding about philosophical and cultural perspectives of Self and Developing an understanding of one's own philosophical and cultural perspectives as a teacher

UNIT- II DEVELOPMENT OF PROFESSIONAL SELF AND ETHICS

- Understanding and sharing one's identity and socio-cultural, historical and political influences in shaping the professional identity
- 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
- Understanding the role of teacher as facilitator and partner in well-being among learners

UNIT- III COPING WITH SOCIAL COMPLEXITIES: ROLE OF EDUCATION

- Expanding human activities and relations; decreasing unhealthy competition, uncertainty and insecurities and the resultant identity conflicts.
- Role of education system, school, community and management for organizing curricular and co- curricular activities leading towards coping with social complexities.

UNIT- IV ROLE OF TEACHER IN DEVELOPING UNDERSTANDING OF SELF AMONG LEARNERS

- Reflecting on one's own childhood and adolescent years of growing-up
- Facilitating development of awareness about identity among learners
- Developing skills of effective listening, accepting, positive regard etc. as a facilitator

TRANSACTIONAL MODALITIES

- 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, humor, 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.

PRACTICUM

- 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
- Practicing selected *asanas, pranayam, meditation and yogic kriyas* as prescribed in class VI to X syllabus of Health and Physical Education, NCERT.

SUGGESTED READINGS

1. Bhatt, H. *The diary of a school teacher.* An Azim Premji University Publication.
2. Retrieved from www.arvindguptatoys.com/arvindgupta/diary-school-teachereng. pdf
3. Bhattacharjee, D.K (ed). (2010). *Psychology and Education – Indian Perspectives*, NCERT, New Delhi
4. Dalal, A.S. (ed) (2001). *A Greater Psychology- An Introduction to the Psychological thoughts of Sri Aurobindo*. Puducherry, Sri Aurobindo Ashram
5. Delors, J. (1996). *Learning the Treasure within –Twenty First Century Education*. UNESCO Education Commission Report.
6. Goel, D.R. (2005). *Quality Concerns in Education.* Centre for advanced study in Education-M. S. University of Baroda
7. Gulati, S., and Pant, D. (2012). *Education for Values in Schools – A Framework.* NCERT, New Delhi.
8. Krishnamurti, J. (1998) *On Self- knowledge.* Chennai, Krishnamurti Foundation India.
9. Krishnamurti, J. (2000). *Education and Significance of Life.* Chennai, Krishnamurti Foundation India.
10. Mukunda, K.V. (2009). What did you ask at school today? A handbook of child learning, Harper Collins.
11. 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
12. Pant, D. and Gulati, S. (2010). *Ways to Peace – A Resource Book for Teachers.* NCERT, New Delhi.
13. Venkatesha murthy, C. G., and Rao, A.V.G (2005). *Life Skills Education Training Package*. R.I.E., Mysore

CURRICULUM AND PEDAGOGIC STUDIES

COURSE NAME: PEDAGOGY OF ENGLISH- II

COURSE CODE: EDU374

L	T	P	CR
4	0	0	4

UNIT- I LANGUAGE, LITERATURE AND AESTHETICS

- Different creative forms of English Language - Literature, media and translation
- Teaching different texts: Poetry, Prose, Drama – Objectives and procedure
- Developing tasks, activities and materials for lesson design.

UNIT- II LESSON PLAN

- **Types of planning** (i) year plan (ii) unit plan (iii) individual lesson plan- Instructional Objectives and Specifications for: prose, poetry, grammar and composition
- Teaching Skills: Introduction, Explanation, probing question, Stimulus Variation and Closing achiever.

UNIT- III DEVELOPMENT AND ANALYSIS OF SYLLABUS AND TEXTUAL MATERIALS

- Language Course Book- Importance, Characteristics and Review
- Library-Importance, Management of Library, Role of Language Library in developing reading habits among the students.

- Language Curriculum-Meaning, Importance and Principles of Curriculum Construction.

UNIT- IV TEACHING-LEARNING MATERIALS AND ASSESSMENT - ITS ROLE AND IMPORTANCE

- Audio-visual aids, Use of Multimedia in ELT, Online Resources for ELT, ELT and Social Networking Websites,
- Planning activities such as discussion, debates, workshops, seminar etc.; Language labs.
- Progress and assessment of development of language - Continuous and comprehensive evaluation;
- Techniques of evaluation— oral, written, portfolio; Cloze test, Self- evaluation; Peer evaluation; Group evaluation.
- Typology of questions; activities and tasks (open ended questions, MCQ, true and false etc.) reflecting— Problem solving, creative and critical thinking, Enhancing imagination and environmental awareness, Construction of language test and Blue Print.

PRACTICUM

1. Take three editorial pieces on the same topic from different newspapers. Have a discussion on their language and presentation.
2. Take two translations of any piece of creative writing. Read these pieces and the translate the piece yourself.
3. Take any creative writing related to history e.g., *Discovery of India* and prepare a flowchart on the main events.
4. Review any story and have a discussion in groups.
5. Take any piece on Geography and prepare a teaching strategy for teaching strategy for teaching any Geographical phenomena

e.g., Climate change, water.

6. Review any two stories of your choice.
7. Interview any local artist/poet/writer.
8. Collect Indian folktales in English (translated) for your portfolio.
9. Prepare a newsletter on the basis of your school experience programme (handwritten).
10. Do a comparative study of one textbook of English from any class (VI to VII) developed by any two states.
11. Prepare an outline for the development of the textbook for the same class for your state.
12. Prepare a list of audio-visual aids related to teaching of English and use them wherever necessary.
13. Identify and prepare different types of teaching aids for children with special needs (speech impaired).
14. Organize a workshop/seminar/conference on the topic Language of Children 'orany other related topic.
15. Take any topic of your choice and write about it in any form of creative writing.
16. Take any creative writing e.g., a poem or a story and develop teaching strategies to teach: (a) same pieces for different stage s;

(b) understanding any creative piece at different levels. (c) teaching the same piece to children with special needs.

17. Prepare a collection of poems and stories of your choice.
18. Prepare an outline for a school magazine.
19. Develop the material for the school magazine based on your experiences during school experience practice (Handwritten).
20. Review contemporary children's literature.
21. Review any two magazines for women.
22. Write a report on current practices of assessment and evaluation at the Upper Primary Stage.
23. Analyze the question papers of English language (Previous-3 years) — classes X& XII (any board) in the light of new approach of assessment.
24. Develop a question paper for upper primary and secondary stage to assess all the aspects of language learning.
25. Analyze answers given by the learners for one particular question.
26. Select any ten questions from the class VI English textbook which lend scope to the creativity of the learners.

i. Study the key points of the 1st term assessment of any student of Class VI

ii. Devise a strategy to incorporate the suggestions given in the 1stCCE report for the progress of the learner.

27. Action Research

i. Identify and list Language (English) related errors common among students.

ii. Prepare a list of idioms, proverb in English

iii. Teaching any creative piece in the classroom on the basis of (a) level of the students (b) perspective teachers

iv. Prepare an outline for action research on the basis of your experience of the difficulties faced during school experience programme.

SUGGESTED READINGS

1. National Curriculum Framework 2005; NCERT, December 2005.

2. National Curriculum Framework 2005; Position Paper, National Focus Group on Teaching of English; NCERT, 2006.
3. National Curriculum Framework 2005, Position Paper, National Focus Group on Teaching of Indian languages, NCERT, 2006.
4. The Right of Children to Free and Compulsory Education Act-2009, The Gazette of India, 2009.
5. Brumfit. C (1984); Communicative methods in Language Teaching; Cambridge University press: Cambridge.
6. Chomsky (1964) in Day. E. M (2002): Identity and the young English language learner; Multilingual Matters Limited; London.
7. Gardner and Lambert (1972) Attitudes and Motivation in second language learning; Rowley; Newbury house.
8. Jeremy Harmer, Longman Handbooks for Language Teachers, The Practice of English Language Teaching, 1998.
9. Srijan1, Creative Writing and Translation, National Council of Educational Research and Training, New Delhi 2010.
10. Samajh ka Madhyum, National Council of Educational Research and Training, New Delhi 2009
11. Source Book on Assessment for Classed I-V, Language English, NCERT, October2008.
12. Learning Indicators till the Elementary Stage, National Council of Educational Research and Training, New Delhi 2015
13. Continuous Comprehensive Evaluation – Exemplar Package for Upper Primary Stage in English, National Council of Educational Research and Training, New Delhi2015
14. Agnihotri, R.K., Khanna, A.L. 1994. (eds.), Second Language Acquisition: Socio cultural and Linguistic Aspects of English in India (RAL1). New Delhi: Sage Publications.
15. Beaumount, M. 1996. The Teaching of Reading Skills in Second/Foreign Language. Patras: The Hellenic Open University.
16. Cummins, J. and Swain, M. 1986. Bilingualism in Education. London: Longman.
17. Ellis, R. 1985. Understanding Second Language Acquisition. Oxford: Oxford University Press.
18. Prabhu, N.S. 1987. Second Language Pedagogy. Oxford; New York: Oxford University Press.
19. Krashen, Stephen. 1989. We acquire vocabulary and spelling by reading: Additional evidence for the input hypothesis. Modern Language Journal 73:4. Pp. 440-64.
20. Kumar, Krishna, 2011. The Childs Language and the Teacher, a Handbook, New Delhi, National Book trust India.

CURRICULUM AND PEDAGOGIC STUDIES

L	T	P	CR
4	0	0	4

COURSE NAME: PEDAGOGY OF HINDI- II
COURSE CODE: EDU376
OBJECTIVES

- भाषाकीअलग–अलगभूमिकाओंकोजाननना
- भाषाकेस्वरूपऔरव्यवस्थाकोसमझना
- भाषासीखनेकेतरीकेऔरप्रक्रियाकोजाननाऔरसमझना
- पाठ्यचर्यापाठ्यक्रमऔरपाठ्यपुस्तककाविश्लेषणकरकक्षाविशेषऔरबच्चोंकीसमझकेअनुसारढालना।
- भाषाऔरसाहित्यकेसंबंधकोजाननना
- हिंदीभाषाकेविविधरूपोंऔरअभिव्यक्तियोंकोजाननना
- भावोंऔरविचारोंकीस्वतंत्रअभिव्यक्तिकरना
- भाषायीबारीकियोंकेप्रतिसंवेदनशीलहोना
- विद्यार्थियोंकीसर्जनात्मकक्षमताकोपहचाननना
- भाषाकेमूल्यांकनकीप्रक्रियाकोजाननना
- भाषासीखनेऔरसिखानेकेसर्जनात्मकदृष्टिकोणकोसमझना।

UNIT I:हहदीउच्चारणिशक्षण

- उच्चारणअवयव/स्थान
- हिंदीकीमानकध्वनियाँएवंवर्गीकरण (स्वरव्यंजन)
- बलाघात, स्वराघात, अनुतान

 अशुद्धउच्चारणकेकारण, उनकेप्रकारएवंसुधारकेउपाय

UNIT II:हहदीशब्दऔरशब्द-रचना

 शब्दऔरउसकेप्रकार:

(क) अर्थकीदृष्टिसे (एकार्थीअनेकार्थीपर्यायवाचीविलोम)

(ख) प्रयोगकीदृष्टिसे (सामान्य, तकनीकी)

(ग) इतिहासकीदृष्टिसे (तत्सम, तद्भव, देशजऔरविदेशी)

 शब्दरचना: उपसर्ग, प्रत्यय, संधिऔरसमासकीअवधारणाऔरशब्दरचनामेंइनकीभूमिका

 शब्दशक्तियां, मुहावरेऔरलोकोक्तियोंकाभाषाशिक्षणमेंमहत्व।

UNIT III:पाठ्यक्रमपाठ्यसामग्रीकाि◌नमााणऔरिवश्लेषणतथा ि◌शक्षणअिधगमसामग्री

 पाठ्यचर्या, पाठ्यक्रमतथापाठ्यपुस्तकोंकासंबंध

 पाठ्यक्रमकानिर्माणएवंपाठ्यपुस्तककाविकास (माध्यमिकस्तरपर)

 भाषाकीपाठ्यपुस्तककीविशेषताएँ

 पाठ्यक्रमएवंपाठ्यपुस्तककाविश्लेषणएवंमूल्यांकन

 रटंतप्रणालीसेनिर्मितवादीउपागमकीओर

 प्रिंटमीडियाएवंअन्यपठनसामग्री।

 पत्रिकाएँसमाचारपत्र, कक्षापुस्तकालय,सूचनाप्रोद्योगिकीएंवश्रव्य-दृष्यसामग्रीरेडियो, दूरदर्शन, फिल्म।

 पाठ्यसहगामीक्रियाएँ (साहित्यपरिषद्परिचर्चा, वादविवाद, कार्यगोष्ठी, सेमिनारइत्यादि)।

 भाषाप्रयोगशाला।

UNIT IV:मूलयांकन–इसकीभूि◌मकाऔरमहत्व

 भाषाविकासकीप्रगतिऔरमूल्यांकन

 सततऔरव्यापकमूल्यांकन

 मूल्यांकनकीप्रविधियाँ–मौखिक, लिखित, स्वमूल्यांकन,

 आपसीमूल्यांकन, समूहमूल्यांकन

 प्रश्नोंकास्वरूप–खुलेप्रश्न, बहुविकल्पीयप्रश्न, सत्यअसत्यप्रश्नइत्यादि।

vf/kxeि◌विधयाँ:व्याख्यानकेसाथ-साथपरिचर्चाछात्रोंद्वारास्वयंकरकेसीखनाउनकीसहभागिताद्वाराशिक्षण।

Language across the Curriculum Activities: As an integral part of teaching-learning process, relevant activities should be carried out to enhance and promote language skills (LSRW) and proficiency based on the rationale of Language across Curriculum. The activities in this regard are language centered and, therefore, the focus of learning and teaching activities should be on language skills not necessarily on the content. The activities in this regard may be designed/improvised according to the context. Some of the exemplar activities may include:

- Presentation (Oral and Written) based on themes from the content area.
- Debate on themes from the content area.
- Panel discussion/Seminar/ discussion.
- Group discussion/group work.
- Question-answer sessions.
- Role play/dramatization.
- Extempore speech/Elocution.
- Organization of reading/reflection activities beyond the textbooks.

ifj;kstukdk;Z:

1. कक्षा6से8तककीहिंदीकीदोराज्योंकीकिसीएकपाठ्यपुस्तककीतुलनाकरना।
2. अपनेराज्यकीकक्षा6से8कीहिंदीकीपाठ्यपुस्तककीरूपरेखाबनाना।
3. विद्यालयपत्रिकाकीरूपरेखाबनाना।
4. समकालीनबालसाहित्यकीसमीक्षाकरना।
5. कक्षा10केहिंदीकेप्रश्नपत्रकीसमीक्षाकरना।
6. महिलाओंकीकिन्हींदोपत्रिकाओंकीसमीक्षाकरना।
7. हिंदीकेकिन्हींदोदलितसाहित्यकारोंकीकिसीएककृतिकीसमीक्षा।
8. कक्षा6से8तककीकिसीएककक्षाकेहिंदीप्रश्नपत्रकानिर्माण।
9. विद्यालयीअनुभवकार्यक्रमकेदौरानभाषाशिक्षणकोलेकरआनेवालीकठिनाइयोंपरक्रियात्मकशोध।
10. अपनेक्षेत्रमेंप्रचलितलोककथालोकगीतोंकासंकलनतैयारकरना।

SUGGESTED READINGS

1. सततएवंव्यापकमूल्यांकन, एन.सी.ई.आर.टी. प्रकाशन।
2. भोलानाथतिवारी, (1967) भाषाविज्ञान, इलाहाबादकिताबमहल।
3. एम०एम०भाटियाऔरसी०एल०नांरग, ¼1984) आधुनिकहहदीशिक्षणविधयाँ, लुधियानाप्रकाशब्रदर्स।
4. माताबदलजायसवाल, मानकहहदीकाएितहासिकव्याकरण, इलाहाबादमहामतिप्रकाशन।
5. रमनबिहारीलाल, (1992-93).हहदीशिक्षण, मेरठरस्तोगीपब्लिकेशन
6. द्वारिकाप्रसादसक्सेना, (2000) भाषाविज्ञानकेसद्ांतऔरहहदीभाषा, मेरठमीनाक्षीप्रकाशन।
7. भाईयोगेंद्रजीत(1994) हहदीभाषाशिक्षण, आगराविनोदपुस्तकमंदिर।
8. MkW- t;iky rjax] ¼2003½ fganh f'k{k.k dh ubZ fn'kk] ubZ fnYyh] lkSE;k izdk'kuA

CURRICULUM AND PEDAGOGIC STUDIES

L	T	P	CR
4	0	0	4

COURSE NAME: PEDAGOGY OF PUNJABI- II
COURSE CODE: EDU378

UNIT- I

1. pMjwbI swihq dy v~K-v~K rUp, skUlI pwTkRmW iv~c v~K-v~K rUpW dI pVHweI (iviSStswihq – kivqw, khwxI, nwvl, nwtk, iekWgI, inbMD) (pRsqwivq pRSn)(lok swihq rUp – suhwg, GoVIAW, is`TxI, Folw, t`pw, bolI, mwhIAw) (pRsqwivq pRSn)
2. skUlI pwTkRm iv~c mIfIAw dI BUimkw
3. BwSw iv~c Anuvwd dw mh~qv qy loV

UNIT- II

1. kivqw qy vwrqk AiDAwpn – mh~qv, audyS, ivDIAW qy AMqr[
2. nwtk is~iKAw – mh`qv, audyS qy ivDIAW, khwxI dI is~iKAw – khwxI suxwaux dI kQw, AiDAwpn ivDIAW
3. siBAwcwr Aqy lokDwrw – siBAwcwr dI jwx pCwx, mh`qv Aqy pCwx icMnH (pRsqwivqpRSn)

UNIT- III

1. pwT Xojnw – pirBwSw, audyS, mh~qqw, ivSySqwvW qy iksmW ,pwT Xojnw dI iqAwrI sUKm pwT XojnW dI iqAwrI qy koSl AiDAwpn[
2. BwSw is~iKAW iv~c shwiek sm~grI–ArQ, mh~qqw, iksmW qy aupXogI vrqoNBwSw pRoXogSwlw – ArQ, audyS, mh~qqw, vrqoN dy FMg[

UNIT- IV

1. pwTpusqk, pwTkRm – audyS, mh~qqw qy isDWq[BwSw is~iKAw leI mulWkx – ArQ qy ivDIAW, inrMqr ivAwpk mulWkx dI Dwrnw AqypjvIN qoN dsvIN q~k AMk vMf[mulWkx leI pRSnW dy rUp Aqy prqvI sUcnw[

INDIVIDUALIZED SESSIONAL WORK: It will include the following activities:

1. Development of lesson plan in Punjabi.
2. Student teachers will be asked to submit a teaching aid useful in the teaching of Punjabi.

SUGGESTED READINGS

1. gzikphਭਾਂ, ftnkeoD ns/ pDso L gzikph :{Bhtof;Nh, gfNnkbk.
2. gzikphôpd o{g ns/ ôpd i'V e'ô L vka joehos f;zx.
3. wks-Gkôk dh f;Zfynk ftXh L vka i;tzs f;zx i;.
4. gzikph Gkôk s/ ;kfjs nfXnkge L vka fJzdod/t f;zx Bzdok.
5. gzikph ;kfjs dh T[sgsh ns/ ftek; - feogkb f;zx e;/b, gofwzdo f;zx, r'fpzd f;zx bKpk bkj"o p[Ze ôkg, b[fXnkDk.
6. wZXekb dh u'Dt] gzikph eftsk - vkH gqhsw f;zx (;zgkH) gpbhe/ôB fpT{o', uzvhrVQ.
7. gzikph nfXn?B d/ w[Yb/ ;zebg - ihs f;zx i'ôh, tko; ôkj ckT{Av/ôB, nzfwqs;o - 1999
8. gzikph Gkôk fbgh ns/ ftnkeoB-vkH ôod/t f;zx frZb b'erhs gqekôB, 2006

L	T	P	CR
4	0	0	4

COURSE NAME: PEDAGOGY OF BIOLOGICAL SCIENCE- II
COURSE CODE: EDU382

UNIT- I CURRICULUM OF BIOLOGY AT SCHOOL STAGE ANDLEARNING RESOURCES

- Recent trends of Science and Biology Curriculum; Gradual evolution of Biology as a discipline;
- Selection and organization of contents in Biology
- Need and significance of learning resources in Biology
- Identifying and analyzing age and stage specific learning resources and using them in teaching-learning process of Biology e.g., for classification and systematic studies of organisms, morphology and anatomy of organisms, and their parts, life processes, understanding about environment and relationships of organisms among themselves and with their environment.
- Biology Laboratory as a learning resource; Design and components of Biology laboratory
- Use of Science and Biology experiment kits in teaching-learning of Biology
- Field visits and excursion as learning resource in Biology: Planning, its organization and observation
- Use of ICT tools and online resources at various stages of school education; ICT based virtual experiments and simulations as learning resource in Biology; Role of the teacher
- Limitations and hurdles in the use of various learning resources in Biology.

UNIT- II PLANNING OF TEACHING-LEARNING OF BIOLOGICAL SCIENCE

- Identification of concepts related to teaching-learning of Biology
- Planning for transaction of concepts and identification of teaching-learning materials; Involvement of learners in the process of design and development of teaching-learning materials.
- Planning for exposure to various learning resources through projects (both in schools and outside), debates, discussions, field visits (Botanical and Zoological Gardens, Science Centers, Science Museums, Sea shores, etc.)
- Planning and organizing activities, experiments, project work and other practical experiences.

UNIT- III TOOLS AND TECHNIQUES FOR ASSESSMENT OF LEARNING INBIOLOGICAL SCIENCE

- Learners‘ record in biological sciences: laboratory investigations, reports of field visits and excursion; Project work and its report; Oral presentation of learners‘ work in Biology; Portfolio
- Assessment through participation in collaborative learning: peer interaction; group discussions, seminars and presentations by learners on various topics related to biological processes, environment and recent advancements in the area of biological sciences
- Development of test-items (open-ended and structured) in biological sciences, its administration, assessment and evaluation
- Assessment of experimental work in biological sciences (formal experiments in laboratories, activities and projects)
- Exploring areas of biological sciences not usually assessed in formal examination systems
- Critical examination of various methods of assessment in biological system
- Recording and reporting of learning evidences/outcome: Measurement of students ‘achievement – marks and grading;

UNIT- IV PROFESSIONAL DEVELOPMENT OF BIOLOGY TEACHERS

- Various professional developmental programmed for teachers such as in- service teachers ‘training, seminars and conferences, membership of professional organizations etc.
- Field visits of teachers to botanical gardens, zoo, National Parks, National level institutes and laboratories in the area of biological sciences
- Exploration on ICT based on-line platforms for sharing of teaching-learning practices,
- Collaborations of schools with colleges, universities and institutes of Higher Education
- Teacher as a researcher: learning to understand how children learn science including biological sciences, Action

research in teaching-learning of Biology.

Practicum

1. Actual experience of Science/Biology laboratory of practicing school (report submission)

i. Planning and conducting experiments for Science/Biology

ii. Managing records

iii. Setting-up of apparatus

iv. Storage of chemicals and apparatus

v. Safety measures being taken in the laboratories and steps taken by the student-teacher

vi. Design of laboratory – structure and physical facilities

vii. Designing laboratory experiences for using in teaching-learning process in classroom situation – two innovative activities and two improvised apparatus (artifacts).

2. Report of one Action Research carried out in the practicing school

3. Report on measures being taken for inclusive teaching-learning and gender issues in practicing school and involvement of the student-teacher

i. Presentation (s) used for teaching-learning in the class

ii. Report on a case study on identifying and addressing issue of alternative concepts in

4. Physical science

i. Critical review of a recently published research paper in Science/Biology Education

5. Journal

i. Critical review of a Textbook of Science/Biology.

CURRICULUM AND PEDAGOGIC STUDIES

L	T	P	CR
4	0	0	4

COURSE NAME: PEDAGOGY OF PHYSICAL SCIENCE- II

COURSE CODE: EDU384

UNIT- I LEARNING RESOURCES IN PHYSICAL SCIENCE

- Identification and use of learning resources from immediate environment (e.g., Natural pH Indicators, Soaps and Detergents, Baking Soda, Washing Soda, Common Salts, Fruits, Fiber, Pulleys, Projectiles, Lenses and Mirrors, Propagation of Waves in solid, liquid and gas, etc.);
- Using community resources: bringing community to the class and taking class to the community; Pooling of learning resources in school complex/ block /district level.
- Improvisation of apparatus, identifying some inexpensive sources of chemicals, Science kits.
- Using laboratory as a learning resource, approaches to laboratory work, planning and organizing laboratory work, safety in laboratories, Physics laboratory, Chemistry laboratory, handling hurdles in utilization of resources.
- Print and ICT resources -- Textbooks, Journal and Magazines; Dales cone of experiences; Different forms of ICT and its applications in science education--audio -aids, video -aids, audio-video aids, educational T.V.; Use of computer for simulation, internet and open learning resources.
- Integrating ICT in teaching- learning process taking examples (e.g., Acid, Base, Salt, Dual Nature of Radiation, Radioactivity, etc.)

UNIT- II TOOLS AND TECHNIQUES ASSESSMENT FOR LEARNING PHYSICAL SCIENCE

- Using the terms test, examination measurement, assessment an evaluation in proper context; Continuous and Comprehensive Evaluation (CCE) and its features; Assessment and evaluation intertwined process of classroom experiences.

- Performance based assessment; Planning assessment framework, learning Indicators (LIs)and its types, developing LIs f or activity, presentation, group work, assignments etc.
- Tools and technique of assessment of written and oral work, project work, laboratory work, field trips, journal writing, concept map; Assessment of learners with special needs.
- Recording and reporting of learning evidences – Measurement of students 'achievement – marks and grading, Measurement of process skills and aptitude of learners; Portfolio – its role in evaluating students' performance

UNIT- III PLANNING FOR TEACHING- LEARNING OF PHYSICAL SCIENCE

- Need of planning teaching-learning experiences; Identification and organization of concepts – basic principles and factors need to be considered for it; Basic elements of a Physical Science lesson with examples from Science/Physics/Chemistry.
- Facilitating formation of groups; Planning and organizing activities in Physical Science, planning laboratory work and ICT application in learning Science/ Physics/ Chemistry.
- Reflective planning; Unit plan; Developing lesson designs on different topics and through various approaches taking examples form Secondary stage (Physical and Chemical Changes, Redox Reaction, Light, Magnetic Effect of Electric Current, etc.)

UNIT-IV PHYSICAL SCIENCE: LIFELONG LEARNING AND PROFESSIONAL DEVELOPMENT OF SCIENCETEACHERS

- Preparing learners for lifelong learning by stimulating creativity and inventiveness in Science – debate, discussion, drama, poster making, visit to various places, science club, celebrating specific days, field visits, science exhibitions: benefits and objectives, evaluation of exhibits, exploring linkages with district/ state/ central agencies; Teacher as a lifelong learner.
- Professional development – Teaching as a profession, need for pre- service and in- service professional development programme, major shift in teacher education programme.
- Various opportunities for in-service professional development –interaction with peer teachers, reading, attending training programme, membership of professional organisation, sharing through conferences, seminars and Journals, travel, cultivating science hobbies, mentoring, teachers exchange programme, acquiring higher qualification, collaborating with universities and other schools etc.
- Role of reflective practices in professional development–questionnaires, research and portfolio.
- Teacher as a researcher – learning to understand how students learn science: Action research – meaning, selecting problems for action research, developing various format for action research, area of action research.
- Steps in action research with examples of physical science; helping students to develop attitude of research.

Practicum

1. (Actual experience of Science/Physics/Chemistry laboratory of practicing school (report submission)

i. Planning and conducting experiments for Science/Physics/Chemistry

ii. Managing records

iii. Setting-up of apparatus

iv. Storage of chemicals and apparatus

v. Safety measures being taken in the laboratories and steps taken by the student-teacher

2. Design of laboratory – structure and physical facilities
3. Designing laboratory experiences for using in teaching-learning process in classroom situation – two innovative activities and two improvised apparatus (artifacts).
4. Report of one Action Research carried out in the practicing school
5. Report on measures being taken for inclusive teaching-learning and gender issues in practicing school and involvement of the student-teacher
6. Presentation (s) used for teaching-learning in the class
7. Report on a case study on identifying and addressing issue of alternative concepts in Physical science
8. Critical review of a recently published research paper in Science/Physics/Chemistry Education Journal

9. Critical review of a Textbook of Science/Physics/Chemistry.

SUGGESTED READINGS

Textbook for B.Ed. Pedagogy of Science: Physical Science Part I & Part II. National Councilor Educational Research and Training, 2013.

CURRICULUM AND PEDAGOGIC STUDIES

L	T	P	CR
4	0	0	4

COURSE NAME: PEDAGOGY OF MATHEMATICS- II
COURSE CODE: EDU380

OBJECTIVES: The course will enable the student teachers to -

- Develop insight into the meaning, nature, scope and objective of mathematics Education;
- Appreciate mathematics as a tool to engage the mind of every student;
- Appreciate mathematics to strengthen the student's resource;
- Appreciate the process of developing a concept;
- Appreciate the role of mathematics in day-to-day life;
- Understand that mathematics is more than formulas and mechanical procedures;
- Channelize, evaluate, explain and reconstruct students_ thinking;
- See mathematics as something to talk about, to communicate through,
- Pose and solve meaningful problems;
- Appreciate the importance of mathematics laboratory in learning mathematics;
- Construct appropriate assessment tools for evaluating mathematics learning;
- Develop ability to use the concepts for life skills;
- Stimulate curiosity, creativity and inventiveness in mathematics;
- Develop competencies for teaching-learning of mathematics through various measures;
- Focus on understanding the nature of children's mathematical thinking through direct
- Observations of children's thinking and learning processes;
- Examine the language of mathematics, engaging with research on children's learning in specific area

UNIT-I

- Meaning, Nature & Characteristics of Mathematics; Concept of Vedic Mathematics; Values of Teaching Mathematics; Mathematics and its relationship with other disciplines; Contribution of Mathematicians - Aryabhatta, Ramanujam, Euclid, Pythagoras. Aims of Teaching Mathematics; Formation of Instructional Objectives in Behavioral Domain.
- Principles of Selection & Organization of Curriculum; Approaches to Curriculum Construction- Topical and Concentric; Qualities of a good Mathematics Text Book.

UNIT-II

- Methods of teaching Mathematics: Inductive — Deductive, Analytic — Synthetic, Lecture cum Demonstration, Problem Solving, Laboratory. Techniques of teaching Mathematics- Assignments, Drill work - Oral and Written, Cooperative Learning.

UNIT- III

- Evaluation in Mathematics: Concept of Evaluation; Construction of Achievement test; Diagnostic Testing & Remedial Teaching.

UNIT- IV

- Recreational Activities in Mathematics: Mathematics Club, Riddles, Puzzles & Magic Squares. Lesson Planning: Meaning, Need & Importance and Steps of Lesson Planning; Formation of Macro Lesson Plan.

INDIVIDUALIZED SESSIONAL WORK: It will include the following activities:

1. Development of lesson plan in mathematics.
2. Student teachers will be asked to submit a teaching aid useful in the teaching of mathematic

TRANSACTIONAL MODALITIES

Communicative/Interactive and Constructivist approaches, imparting knowledge by means of creating situations. Teaching and learning of the course will be through a student- centered approach. Different interactive strategies, such as group discussions, presentations, and assignments will be applied to promote creativity. Independent learning will also be encouraged through class assignments. The course readings will be provided to students at the start of the course to inculcate the habit of reading. This will also help to raise the level of in-class discussion and make the course more dynamic.

SUGGESTED READINGS

1. Aggarwal, J. C. (2008). Teaching of Mathematics. New Delhi: Vikas Publishing House Pvt Ltd.
2. Bagyanathan, D. (2007). Teaching of Mathematics. Chennai: Tamil Nadu Text Book Society.
3. Bishop, G. D. (1965). Teaching Mathematics in the Secondary School. London: Collins Publication.
4. Bolt, B., & Hobbs, D. (2005). 101 Mathematical Projects. New Delhi: CambridgeUniversity Press.
5. Butter, C. H., & Wren, F. L. (1965). The Teaching of Secondary Mathematics. London: Mc Graw Hill Book Company.
6. Dececco, J. P., & Crawford, W. (1977). The Psychology of Learning and Instruction. New Delhi: Prentice Hall of India Private Ltd.
7. Ediger, M., & Bhaskara Rao, D. B. (2004). Teaching Mathematics Successfully. New Delhi: Discovery Publishing House.
8. Ediger, M., & Rao, D.B. (2000). Teaching Mathematics Successfully. New Delhi: Discovery Publishing House.
9. Goel, Amit. (2006). Learn and Tteach Mathematics. New Delhi: Authors Press.
10. Hoglum, L. (1967). Mathematics for the Million. London: Pan Books Limited.
11. ICFAI. (2004). Methodology of Teaching Mathematics. Hyderabad: ICFAI University Press.
12. Iyengar, K. N. (1964). The Teaching of Mathematics. New Delhi: A Universal Publication.
13. Kapoor, S. K. (2006). The Teaching of Vedic Mathematics. New Delhi: Lotus Press.
14. Kulshreshtha, A. K. (2008). Teaching of Mathematics. Meerut: R.Lall Books Depot.
15. Land, F. W. (1966). New Approaches to Mathematics Teaching. New Delhi: Mac Millan, St. Martin's press.
16. Reymond, B. (2000). Math-tricks, Puzzles and Games. New Delhi: Orient Paperbacks.
17. Sakuntala, D. (1999). More Puzzles. New Delhi: Orient Paperbacks.
18. Schwartz, S. L. (2007). Teaching Young Children Mathematics. London: Atlantic Publishers & Distributors (P) Ltd.
19. Sharan, R., & Sharma, M. (2006). Teaching of Mathematics. New Delhi: A.P.H. Publishing Corporation.
20. Sharan, R., & Sharma, M. (2006). Teaching of Mathematics. New Delhi: A.P.H. Publishing Corporation.
21. Siddiqui, M. H. (2005). Teaching of Mathematics. New Delhi: A.P.H. Publishing Corporation.
22. Sidhu, K. S. (2006). The Teaching of Mathematics. New Delhi: Sterling Publishers private ltd.
23. Singh, M. (2006). Modern Teaching of Mathematics. New Delhi: Anmol Publications Pvt. Ltd.

FIELD ENGAGEMENT/ INTERNSHIP/ DEVELOPING CRITICAL SKILLS

COURSE NAME: PRE- INTERNSHIP

COURSE CODE: EDU392

L	T	P	CR
0	0	4	4

OBJECTIVES OF THE COURSE: On completion of the Course, the students will be able to:

- Understand about the activities to be carried out during school internship programme.
- Observe classroom teaching, various school activities and gain a feel of the multiple roles of a teacher.
- Develop skill in content analysis, preparing TLM and observing classroom processes.
- Plan and implement teaching learning activity for peers and actual classroom.

DURATION- FOUR WEEKS

PRE- INTERNSHIP TASKS

- (The Internship Committee formulated by the Institute will prepare a Schedule for execution of Pre- Internship Tasks)
- During the four-week duration, the student teachers are oriented to the school internship programme.
- For the first two weeks, they will be provided training in core teaching skills, content analysis, preparing Teaching Learning Material (TLM), writing observation records, Reflective Journals, conducting Action Research and Case Study, organizing school activities and their reporting, developing Achievement Tests, administering and analyzing. Student teachers will also write lesson plans and take up peer teaching.
- For the next two weeks, student teachers will be placed in the schools. They will observe the classes being handled by the regular teachers as well as their peers. Every student teacher will teach at least one lesson in each teaching subject and reflect on the teaching.

MODES OF LEARNING ENGAGEMENT

- Pre internship will be carried out both in the Institute and the School.
- First two weeks they will be exposed to theoretical knowledge about internship and receive information on various activities that are required to be carried out by the student teachers.
- Student teachers will get hands on experience on performing certain tasks which they are expected to perform in the school.
- In the beginning they learn to teach in a simulated condition by teaching their peers.
- Next two weeks, student teachers are attached to the school on full time basis, observe the teaching by the regular classroom teacher, teach at least one lesson in each teaching subject, involve in all the activities of the school and learn to understand the school.
- Student teachers keep a record of all the work carried out by them in the school (Details to be worked out).

EVALUATION CRITERIA

Distribution of Marks for the School Exposure and Multicultural Placement		
Activity	**Max. Marks**	**Min. Pass Marks**
Content Analysis in each teaching subject	20	10
Preparation and use of learning resources during peer teaching in each teaching subject (two)	10+10 =20	10
Observation record • Five classes of regular classroom teacher • Five classes of peer	10+10=20	10
Actual classroom teaching (Two lesson in each teaching subject)	40	20
Total	**100**	**50**

Semester- VII

COURSE	COMPONENT	NATURE	COURSE CODE	COURSE NAME	DISTRIBUTION OF HOURS			TOTAL CREDITS
					LECTURE	TUTORIAL	PRACTICAL	
12.	Field Engagement/ Internship/ Developing Critical Skills	Compulsory	EDU491	Internship	0	0	**14 Weeks**	**14**
13.	Field Engagement/ Internship/ Developing Critical Skills	Compulsory	EDU493	Working with Community	0	0	**2 Weeks**	**2**
GRAND TOTAL								16

FIELD ENGAGEMENT/ INTERNSHIP/ DEVELOPING CRITICAL SKILLS

COURSE NAME: INTERNSHIP

COURSE CODE: EDU491

L	T	P	CR
0	0	14	14

CONTACT HOURS- FOURTEEN WEEKS

OBJECTIVES OF THE COURSE: On the completion of the course the student teachers will be able to:

 Observe the classes of regular teachers and peers and learn about teaching learning process and classroom management.

 Develop skill in planning and teaching in actual classroom environment.

 Reflect, learn to adapt and modify their teaching for attaining learning outcomes of students.

 Maintain a Reflective Journal.

 Acquire skill in conducting Action Research/ Case Study.

 Inculcate organizational and managerial skills in various school activities.

 Create and maintain resources for teaching and learning in internship schools.

 Work with the community in the interest of the learner and their learning outcomes.

INTERNSHIP TASKS

The student teachers will perform the following in the school attached to her/him.

(a) Delivery of lessons

 The student teachers will deliver a minimum of 40 lessons including two criticism lessons (one at the end of 9th week and the other during the last week of the teaching assignment) in each Pedagogy course. In total they will teach 80 lessons in two Pedagogy courses (Preferably 20 lessons for Upper Primary classes and 20 for Secondary classes in each Pedagogy course).

 The student teachers will visualize details of teaching learning sequences, keeping all considerations in view. They will also involve themselves in discussion, reflection, reconsideration and consolidation after each lesson as well as at the end of the unit.

(b) Practicum

 Preparation, administration and analysis of achievement tests in two Pedagogy courses.

 Conducting Action Research/ Case Study.

 Observing ten lessons of a regular teacher and ten lessons of peers in each Pedagogy course and preparing an Observation Record.

 Preparing and using teaching aids in each Pedagogy course.

 Writing a Reflective Journal.

 Organizing any two co-curricular activities and reporting.

 Preparing a suggestive comprehensive plan of action for improvement of some aspects of the school, where they have been teaching during Internship.

 Reporting on activities conducted with the community.

Any other activity given under Suggested School Activities can be studied after consultation with the Faculty, in charge of learning to function as a teacher (School Internship).

SUGGESTED SCHOOL ACTIVITIES

 Organizing cultural, literary, sports and games activities

 Framing of time table

 Organizing Morning Assembly

 Maintenance of school discipline

 Maintenance of school records, library and laboratories

 Providing Guidance and Counseling services

 Studying the role of community in school improvement

 School Mapping

 Water Resource Management in schools

 Mass awareness of social evils and taboos
 Organizing educational fair, exhibition, club activities, nature study and field trip. (Any other activity/ activities decided by the Institute)

MODES OF LEARNING ENGAGEMENT
 Internship tasks will be carried out as a part of the _in-school 'practice. A mentor/cooperating teacher and supervisor of the Institute will guide the student teacher periodically.
 Student teachers will observe at least 10 lessons of regular classroom teacher and 10 lessons of their peers.
 Adequate classroom contact hours - a minimum of 40 lessons including two criticism lessons in each Pedagogy course preferably 20 lessons for Upper Primary classes (VI-VIII and 20 lessons for Secondary classes (IX and X) for subject based teaching – learning will be under taken in consultation with the school authorities.
 A Reflective Journal will be maintained by the student teacher in which she/he records her/his experiences, observations and reflections on classroom experiences.
 A portfolio will be maintained by the student teachers which includes lesson plans, resources used, assessment tools, student observations and other records.
 Student teachers will always work in liaison with the regular teachers in the schools involving themselves in all the school activities and conducting at least two activities.
 The Institute in consultation with the schools will prepare the details of the internship programme for each of the schools.

EVALUATION CRITERIA

Distribution of Marks for the School Internship		
Activity	**Max. Marks**	**Min. Marks**
Classroom Teaching (two Pedagogy courses)	200	100
Criticism Lessons (four lessons in total)	40	20
Reflective Journal (two Pedagogy courses)	10	5
Observation Records • Ten lessons of school teacher • Ten lessons of peer	5+5 =10	5
Achievement test-development, Administration and Analysis	10	5
Case Study/ Action Research	10	5
Detailed Record of any two activities organized by the student teacher	10	5

Learning Resource in two teaching subjects	10	5
Total	**300**	**150**

FIELD ENGAGEMENT/ INTERNSHIP/ DEVELOPING CRITICAL SKILLS

L	T	P	CR
0	0	2	2

COURSE NAME: WORKING WITH COMMUNITY
COURSE CODE: EDU493

CONTACT HOURS- TWO WEEKS
OBJECTIVES OF THE COURSE: On completion of the course, the student teacher will be able to:
- Acquaint themselves with the factors working in the society/community i.e., knowledge of social realities.
- Develop the dignity of labour among them.
- Arouse their interest in the social and economic reconstruction of the country.
- Make themselves aware of the educational problems and needs of the society.
- Enable them for preparing youth for sustainable development.
- Develop their personality through community service.

METHODOLOGY

The students will spend 2 weeks at a stretch during the academic year in the identified village. Separate activities will be undertaken every year out of the following or given by the Institute.

SUGGESTED ACTIVITIES

1. Shramdaan and beautification
2. Study of educational scenario of a community. Reporting the profile of each Institution/NGO/social organization, which is directly or indirectly concerned with educational /literacy programme.
3. Micro planning exercises for assessing the educational status of the community
4. Organization of ―Nukad Natak‖ ―Cultural Programmes‖, ―Rallies‖ etc. for motivating the villagers for sending their wards to schools.
5. School mapping exercises for assessing the educational need of the community.
6. Study of enrolment, stagnation and dropout problems.
7. Exploring the community resources and finding means and ways of using them for betterment of school.
8. Adopting a community and implementation of the Lab Area Concept in adopted community.
9. Survey of nearby community (adopted community) and assessing its educational needs, social needs etc.
10. Conducting awareness programmes in the community- like Environment conservation, tree plantation, watershed management, health programmes like vaccination, polio drop etc. AIDS awareness, electoral awareness, load safety, human rights, women rights etc.
11. Organization of Literacy programmes in the community
12. Cleanliness drives in the community and awareness about their needs
13. Character building programmes
14. Developing healthy food habits among the community
15. Conducting Vocational training programmes for self- employment.
16. Promoting peace-oriented values in the community.
17. Remedial teaching work for poor and needy in the community.
18. Action Research regarding local problems in consultation with the community.

19. Promoting peace-oriented values in the community.
20. Conducting Adult Education programmes
21. Assistance and working with local community in actual relief work whenever needed.
22. Training of community in First Aid.
23. Helping the children with special needs.
24. Conducting Vocational training programmes for self- employment.

MODES OF LEARNER ENGAGEMENT
Proposed activities of the programme will be organized keeping in view the budgetary provision and the time of duration along with the required available facilities at the time of organization of the programme.

MODES OF INTERNAL ASSESSMENT
Internal assessment of Punctuality, Regularity, Discipline, Cooperation and Performing Arts will be done through observation of the students and viva- voce will be conducted on their experiences and written report prepared by the student teachers.

EVALUATION CRITERIA

Distribution of Marks for the Working with Community	
Activity	**Marks**
Punctuality, Regularity, Discipline, Cooperation & Performing Arts	10
Participation in various activities and Report	30
Viva Voce	10
Total Marks	**50**

Semester- VIII

COURSE	COMPONENT	NATURE	COURSE CODE	COURSE NAME	DISTRIBUTION OF HOURS			TOTAL CREDITS
					LECTURE	TUTORIAL	PRACTICAL	
14.	Perspectives in Education	Core Course	EDU402	Knowledge and School Management	**6**	**0**	**0**	**6**
15.	Perspectives in Education	Core Course	EDU404	Curriculum Development	**6**	**0**	**0**	**6**
16.	Perspectives in Education	Core Course	EDU406	Creating an Inclusive School	**6**	**0**	**0**	**6**
17.	Field Engagement/ Internship/ Developing Critical Skills	Compulsory	EDU494	Post Internship Engagement with the Field Task	**0**	**0**	**1 Week**	**1**
GRAND TOTAL								**19**

PERSPECTIVES IN EDUCATION

COURSE NAME: KNOWLEDGE AND SCHOOL MANAGEMENT

L	T	P	CR
6	0	0	6

COURSE CODE: EDU402

OBJECTIVES: The student will be able to understand:

- About epistemological bases of knowledge
- Teacher centric and learner centric knowledge transmission.
- Recommendations and uses of the NCF 2005 in school
- To understand the concept and operational components of school management.
- To enlist the physical resources of the school and the importance of their maintenance.

COURSE CONTENT

UNIT- I KNOWLEDGE AND KNOWING

- Concept, Meaning and Nature of Knowledge.
- Knowing Process: Different ways of knowing; Knowledge constriction, Process of Construction of Knowledge. Relative roles of knower and the known in knowledge transmission and construction

UNIT- II EPISTEMOLOGICAL BASES OF KNOWLEDGE

- Differentiate between information, knowledge, belief and truth.
- Facets of knowledge: Different facets of knowledge and relationship, such as: local and universal, concrete and abstract, theoretical and practical, contextual and textual, school and out of school with an emphasis on understanding special attributes of school knowledge.
- Role of culture in knowing

UNIT- III SCHOOL ORGANIZATION AND MANAGEMENT

- School as an organization: Meaning, Objectives and Principles of school organization,
- Institutional Planning: Meaning, objectives, characteristics, and advantages of institutional planning.
- Norms and conditions of opening a school according to CBSE

UNIT- IV MECHANISM FOR CO-ORDINATED FUNCTIONING IN SCHOOL

- School Time Table: Importance, Types and Principles of time table construction.
- Co-curricular Activities: Meaning, Importance, Principles of organizing co-curricular activities (Especially Morning Assembly, NSS, NCC, Field trips).
- School Records and Registers: Need and Importance, Types, Characteristics and Maintenance.
- Biometric Attendance System: Concept, Significance and Challenges in Indian context.

INDIVIDUALIZED SESSIONAL WORK: It will include the following activities:

1. Construction of a Time-Table of school.
2. Maintenance of any one school record/ register
3. Report on the best practices followed in the school to maintain quality of education.
4. Cumulative Record Card and Anecdotal records Maxims of curriculum development

TRANSACTIONAL MODALITIES

Communicative/Interactive and Constructivist approaches, imparting knowledge by means of creating situations. Teaching and learning of the course will be through a student-centered approach. Different interactive strategies, such as group discussions, presentations, and assignments will be applied to promote creativity. Independent learning will also be encouraged through class assignments. The course readings will be provided to students at the start of the course to inculcate the habit of reading. This will also help to raise the level of in-class discussion and make the course more dynamic.

SUGGESTED READINGS

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13. xqIrk ,y- Mh- ¼1990½- mPp 'kSf{kd iz'kklu- gfj;k.kk lkfgR; vdkneh p.Mhx<-A
14. lqf[k;k ,l- ih- ¼1965½- fo|ky; iz'kklu ,oa laxBu- vkxjk- fouksn iqLrd eafnjA
15. of'k"B ds d-s ¼1985½- fo|ky; laxBu ,oa Hkkjrh; f'k{kk dh leL;k,sa] esjB- yk;y cqd fMiksA
16. nso vkpk;Z egsUnz- ¼1998½- fo|ky; izcU/k]jk"Vªok.kh- fnYyh- izdk'kuA
17. 'kekZ vkj-,- ¼1995½- fo|ky; laxBu rFkk f'k{kk- esjB- iz'kklulw;kZ ifCyds'kuA
18. O;kl gfj'pUnz- ¼2003½- 'kSf{kd izcU/k vkSj f'k{kk dh leL;k,sa- ubZ fnYyh- vk;Z cqd fMiks] 30 ukbZokykdjkSyckxA
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25. Sodhi, T. S and Suri, Aruna (2002). Management of School education, Bawa Publications
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PERSPECTIVES IN EDUCATION

COURSE NAME: CURRICULUM DEVELOPMENT

L	T	P	CR
6	0	0	6

COURSE CODE: EDU404

OBJECTIVES: The student will be able to understand:

- The concepts and approaches of curriculum development.
- The curriculum reform in the Indian context.
- The models and process of curriculum development.
- The strategies of curriculum implementation.
- The concept, types of curriculum and differentiate between curriculum framework, curriculum and syllabus
- The principles of curriculum development Examination issues in curriculum development.

UNIT- I CONCEPT OF CURRICULUM

- Meaning and concept of curriculum; Types of curriculum: Core, Hidden, Null and Latent; foundations of curriculum i.e., Philosophical, Sociological, Psychological, Historical
- Meaning of Curriculum framework, syllabus, textbook, differentiated curriculum, Contextualized Curriculum
- Changing paradigms in education: Cognitivism, behaviorism, constructivism, connectivism.

 Activity- based curriculum. Discovery Approach,

UNIT- II BASICS OF CURRICULUM DEVELOPMENT

 Need, Importance and Process of Curriculum development
 Principles and Theories of curriculum development
 Models of curriculum development
 Stage Specific Curriculum-Pre-primary, Primary, Secondary, Higher Secondary
 Curriculum reforms in India; National Curriculum Frameworks

UNIT- III CURRICULUM DEVELOPMENT

 Process of Curriculum Development.
 Formulating aims and objectives.
 Criteria for selecting knowledge and representing knowledge in the form of different subjects.
 Organizing fundamental concepts and themes vertically across levels and integrating themes within (and across) different subject.
 Selection and organization of learning situations.

UNIT- IV CURRICULUM IMPLEMENTATION AND EVALUATION

 Role of state and national agencies in implementing curriculum.
 Teachers 'role in generating dynamic curricular experiences through:
 Flexible interpretation of curricular aims.
 Contextualization of learning.
 Varied learning experiences.
 Learning resources.
 Translating curricular objectives into instructional planning.
 Need and evaluation of effective curriculum construction with reference to existing pedagogies and instructional approaches, teacher training, textbooks and instructional materials.
 Role of MHRD, NCERT and the States in curriculum reform.

INDIVIDUALIZED SESSIONAL WORK: It will include the following activities:

5. Organize a cultural activity to depict multicultural aspect and submit a report.
6. Conduct a survey on gender issue and submit a report.
7. Policy analysis National Curriculum Frame works: Preparing a critical overview
8. Role of teaching in Multi-cultural setting
9. Maxims of curriculum development
10. Identification of core, hidden, null and latent curriculum in textbooks.
11. Designing an activity-based curriculum.
12. Analysis of School Curriculum at different stages
13. Discussion on a local specific contextualized curriculum
14. Curriculum and Syllabi and Textbook analysis.
15. Preparation of a transactional blueprint of any content unit in any school subject at the secondary level.
16. Preparation of an appraisal report on the curriculum renewal process during post NPE (1986) period.

TRANSACTIONAL MODALITIES

Communicative/Interactive and Constructivist approaches, imparting knowledge by means of creating situations. Teaching and learning of the course will be through a student-centered approach. Different interactive strategies, such as group discussions, presentations, and assignments will be applied to promote creativity. Independent learning will also be encouraged through class assignments. The course readings will be provided to students at the start of the course to inculcate the habit of reading. This will also help to raise the level of in-class discussion and make the course more dynamic.

SUGGESTED READINGS

1. Aggrawal, J.C., & Gupta, S. (2005). *Curriculum Development.* New Delhi: ShipraPublisher.
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PERSPECTIVES IN EDUCATION

COURSE NAME: CREATING AN INCLUSIVE SCHOOL

COURSE CODE: EDU406

L	T	P	CR
6	0	0	6

OBJECTIVES: To enable the student teacher to understand
- Different concepts, importance, trends and issues in Special Education
- Various techniques of inclusive teaching and evaluation in special education.
- The needs of Exceptional children suffering from visual/ hearing/ speech impairment.
- The various aspects and educational implications of ADHD, Mental Retardation and Autism spectrum disorder.
- The concept of Learning disabilities, neurological and loco motor disabilities.

COURSE CONTENT

UNIT- I
- Special Education: Concept, Importance, Role of a Special Educator, Special Classroom.
- Issues and Changing trends in Special Education.
- Role of a psychologist in dealing with the problems of Exceptional children.

UNIT- II
- Visual Impairment: Concept, Characteristics, Causes, Categories, Behavioural Indicators and Education of the Visually Impaired.
- Hearing Impairment: Concept, Characteristics, Causes, Categories, Behavioural Indicators and Education of Hearing impaired.
- Speech Impairment: Concept, Characteristics, Causes, types, Behavioural Indicators and Education of Children with Speech Impairment.

UNIT- III
- Attention Deficit Hyperactivity Disorder (ADHD): Concept, Educational & Psychological Strategies, Cognitive & Behavioral Therapies to treat ADHD children.

 Mental Retardation: Concept, Characteristics, Causes, Classification, Educational provisions and Therapeutic Interventions.
 Autism Spectrum Disorders: types, Identification and Educational Programmes.

UNIT- IV
 Learning Disability (Dyslexia, Dyscalculia, Dysgraphia, Dyspraxia, Aphasia): educational provisions.
 Leprosy Cured, Neurological and Locomotors Disabilities: Definition, Causes, Characteristics, Classification, and Educational Programmes.
 Distinction between children with Learning Disabilities, Slow Learners and children with Mental Retardation.

INDIVIDUALIZED SESSIONAL WORK: It will include the following activities:
1. Wechsler Intelligence Scale for Children (WISC)
2. Bender Visual Motor Gestalt Test
3. The Stroop- Effect test
4. Case-Study of any one exceptional child to know about his/her experiences.
5. Assignment related to Sign Language/ Braille.
6. Teaching Retarded learners Curriculum and Methods for improving Instruction
7. Visit to an Institution of Differently abled children and make a report based on observation
8. Educating Children with Learning Problems in Regular Schools.
9. Make a project report on Integrated Education of the Visually Handicapped, Management Perspectives

TRANSACTIONAL MODALITIES
Communicative/Interactive and Constructivist approaches, imparting knowledge by means of creating situations. Teaching and learning of the course will be through a student-centered approach. Different interactive strategies, such as group discussions, presentations, and assignments will be applied to promote creativity. Independent learning will also be encouraged through class assignments. The course readings will be provided to students at the start of the course to inculcate the habit of reading. This will also help to raise the level of in-class discussion and make the course more dynamic.

SUGGESTED READINGS
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FIELD ENGAGEMENT/ INTERNSHIP/ DEVELOPING CRITICAL SKILLS

L	T	P	CR
0	0	1	1

COURSE NAME: POST INTERNSHIP ENGAGEMENT WITH THE FILED TASK AND ASSIGNMENT FOR, EPC2, EPC4, PE6 & PE7 SUBMISSION OF MENTORSHIP REPORT
COURSE CODE: EDU494

 Post Internship is organized for a day mainly for reflection and review of internship programme as a whole, to facilitate the understanding of the effectiveness of various activities undertaken during the internship. The tasks include the following:
 Seeking reactions from students, teachers, Heads and teachers of cooperating schools and supervisors of the Institute.
 Exhibition of the Teaching Learning Material used by the student teachers during the internship.
 Any other activity decided by the Institute.
 Inviting suggestions for improving the programme.