COURT MEETING: ***28.03.2024***
Appendix-VI

Volume - II

AMENDMENTS TO ORDINANCES
AND
APPENDICES TO THE ORDINANCES

(Amendments approved by the Executive Council in its meetings dated, 09.06.2023, 15.12.2023, 08.03.2024)

UNIVERSITY OF DELHI

CONTENTS

Note : ***Notifications of all the above mentioned amendments are available on the website of the University. Further, notification of Amendment to Ordinance V i.e change in syllabi of courses under UGCF is available on the website under the link {****NEP: UGCF 2022 Syllabi - Delhi University (du.ac.in)****}.***

Annexure-55

Sub: Amendment to Ordinance V

[E.C Resolution No. 14-1/-(14-1-6/-) dated 09.06.2023]

Following addition be made to Appendix-II-A to the Ordinance V (2-A) of the Ordinances of the University;

Add the following:

Syllabi of Semester-IV/V in respect of the Physics Component of following courses under under Faculty of Science based on Under Graduate Curriculum Framework - 2022 implemented from the Academic Year 2022-23:

(i) **SEMESTER-IV/V:** BSc. (Analytical Chemistry) – DSC/DSE
(As per Annexure-1)

(ii) **SEMESTER-IV/V:** BSc. (Industrial Chemistry) – DSC/DSE
(As per Annexure-2)

ANNEXURE-1

SEMESTER-IV/V
ANALYTICAL CHEMISTRY

DISCIPLINE SPECIFIC CORE COURSE
THERMAL PHYSICS AND STATISTICAL MECHANICS

Course Title & Code	Credits	Credit distribution of the course			Pre-requisite of the course
		Lecture	Tutorial	Practical	
Thermal Physics and Statistical Mechanics	**4**	**2**	**0**	**2**	--

LEARNING OBJECTIVES

This course will review the basic concepts of thermodynamics, kinetic theory of gases with a brief introduction to statistical mechanics. The primary goal is to make the student understand the applications of fundamental laws of thermodynamics to various systems and processes. This coursework will enable the students to understand the connection between the macroscopic observations of physical systems and microscopic behaviour of atoms and molecule through a brief knowledge of statistical mechanics. The laboratory course deals with providing the knowledge of the concepts of thermodynamics along with Planck's law and Stefan Boltzmann laws related to black body radiation.

LEARNING OUTCOMES

At the end of this course, students will be able to,

- Get an essence of the basic concepts of thermodynamics, the first and the second law of thermodynamics, the concept of entropy and the associated theorems, the thermodynamic potentials and their physical interpretations along with Maxwell's thermodynamic relations.
- Know the fundamentals of the kinetic theory of gases, Maxwell-Boltzman distribution law, mean free path of molecular collisions, viscosity, thermal conductivity and diffusion.
- Learn about the black body radiations, Stefan- Boltzmann's law, Rayleigh-Jean's law and Planck's law and their significances.
- Gain the basic knowledge about quantum statistics: the Bose-Einstein statistics and the Fermi-Dirac statistics.
- In the laboratory course, the students are expected to: Measure of Planck's constant using black body radiation, determine Stefan's Constant, coefficient of thermal conductivity of a bad conductor and a good conductor, determine the temperature coefficient of resistance, study variation of thermo-emf across two junctions of a thermocouple with temperature etc.

SYLLABUS

THEORY COMPONENT

Unit – I **(11 Hours)**

Laws of Thermodynamics: Fundamental basics of thermodynamic system and variables, zeroth law of thermodynamics and temperature, first law and internal energy, various thermodynamical processes, applications of first law: general relation between C_P and C_V, work done during various processes, compressibility and expansion coefficient, reversible and irreversible processes, second law: Kelvin-Planck and Clausius statements, Carnot engine, Carnot cycle and theorem, basic concept of entropy, entropy changes in reversible and irreversible processes, Clausius inequality, entropy-temperature diagrams.

Unit – II **(5 Hours)**

Thermodynamic potentials and Maxwell's relations: Basic concept of thermodynamic potentials, internal energy, enthalpy, Helmholtz free energy, Gibb's free energy, derivation of Maxwell's thermodynamic relations and their applications in Clausius Clapeyron equation, value of $C_P - C_V$, TdS equations, evaluation of C_P/C_V

Unit – III **(6 Hours)**

Kinetic Theory of Gases and Molecular Collisions: Maxwell-Boltzmann law of distribution of velocities in an ideal gas and its experimental verification, Mean, Root Mean Square and Most Probable Speeds, Mean Free Path (Zeroth order only)

Unit – IV **(4 Hours)**

Theory of Radiation: Blackbody radiation, spectral distribution, derivation of Planck's law, idea about Wein's law, Rayleigh-Jeans law, Stefan Boltzmann law and Wien's displacement law (derivation not required)

Unit – V **(4 Hours)**

Statistical Mechanics: Macrostate and Microstate, phase space, entropy and thermodynamic probability, Maxwell-Boltzmann law, qualitative description of quantum statistics – Bose Einstein and Fermi Dirac, comparison of three statistics.

References:

Essential Readings:

1) Heat and Thermodynamics, M. W. Zemansky and R. Dittman, 1981, Tata McGraw-Hill.
2) Thermal Physics, S. C. Garg, R. M. Bansal and C. K. Ghosh, 2nd edition, Tata McGraw-Hill.
3) Thermodynamics, Kinetic Theory and Statistical Thermodynamics, Sears and Salinger, 1988, Narosa.
4) Concepts in Thermal Physics, Blundell and Blundell, 2nd edition, 2009, Oxford University Press.
5) Thermal Physics, A. Kumar and S. P. Taneja, 2014, R. Chand Publications.
6) A Text Book of Heat and Thermodynamics for Degree Students, J. B Rajam, 1981, S. Chand.
7) Statistical Physics : Berkley Physics Course, F. Reif, Mc Graw Hill

Additional Readings:

1) An Introduction to Thermal Physics, D. Schroeder, 2021, Oxford University Press (earlier

published by Pearsons).
2) Thermal Physics: C. Kittel and H. Kroemer, 1980, 2nd edition
3) Heat, Thermodynamics and Statistical Physics, B. Lal, N. Subrahmanyam and P. S. Hemne, S. Chand and Company

PRACTICAL COMPONENT

(15 Weeks with 4 hours of laboratory session per week)

At least 6 experiments to be performed from the following list

1) To determine mechanical equivalent of heat, J, by Callender and Barne's constant flow method.
2) To determine the coefficient of thermal conductivity of Cu by Searle's apparatus.
3) To determine the coefficient of thermal conductivity of a bad conductor by Lee and Charlton's disc method using steam or electrical heating.
4) Measurement of Planck's constant using black body radiation.
5) To determine the temperature coefficient of resistance by Platinum Resistance Thermometer by Carey Foster's Bridge
6) To study the variation of thermos-emf across two junctions of a thermocouple with temperature.
7) To determine Stefan's constant.
8) To determine the temperature coefficient of resistance using Platinum Resistance Thermometer using Callender and Griffith Bridge.

References for laboratory work:

1) Advanced Practical Physics for students: B. L. Flint and H. T.Worsnop, 1971, Asia Publishing House.
2) A Text Book of Practical Physics: I. Prakash and Ramakrishna, 11th edition, Kitab Mahal
3) Advanced level Practical Physics, Nelkon and Ogborn, 4th edition, reprinted 1985, Heinemann Educational Publishers.
4) An Advanced Course in Practical Physics, D. Chattopadhyay and P. C. Rakshit, 1990, New Central Book Agency.
5) Practical Physics, G. L. Squires, 1985, Cambridge University Press.
6) B.Sc. Practical Physics, H. Singh and P.S. Hemne, revised edition 2011, S. Chand and Co.
7) B.Sc. Practical Physics, C. L. Arora, 2001, S. Chand and Co.
8) B.Sc. Practical Physics, G. Sanon, R. Chand and Co.

POOL OF DSEs

DISCIPLINE SPECIFIC ELECTIVE COURSE
SOLID STATE PHYSICS

Course Title & Code	Credits	Credit distribution of the course			Pre-requisite of the course
		Lecture	Tutorial	Practical	
Solid State Physics	4	2	0	2	Understanding of basic concepts of Physics

LEARNING OBJECTIVES

This course introduces the basic concepts and principles required to understand the various properties exhibited by condensed matter, especially solids. It enables the students to appreciate how the interesting and wonderful properties exhibited by matter depend upon its atomic and molecular constituents. It also communicates the importance of solid state physics in modern society.

LEARNING OUTCOMES

On successful completion of the module students should be able to,

- Elucidate the concept of lattice, crystals and its planes
- Understand the elementary lattice dynamics and its influence on the properties of materials
- Understanding about origin of energy bands, and their influence on electronic behaviour
- Explain the origin of dia-, para-, and ferro-magnetic properties of solids
- Explain the origin of the dielectric properties exhibited by solids and the concept of polarizability
- In the laboratory students will carry out experiments based on the theory that they have learned to measure the magnetic susceptibility, dielectric constant, trace hysteresis loop. They will also employ to four probe methods to measure electrical conductivity and the hall set up to determine the hall coefficient of a semiconductor.

SYLLABUS

THEORY COMPONENT

Unit – I - Crystal Structure **(10 Hours)**

Solids: Amorphous and Crystalline Materials, Lattice Translation Vectors, Lattice with a Basis, Unit Cell, Types of lattices, Miller Indices, Reciprocal Lattice, Ewald's construction (geometrical approach) Brillouin Zones, Diffraction of X-rays by Crystals, Bragg's Law

Unit – II - Elementary Lattice Dynamics **(6 Hours)**

Lattice vibrations and phonons: linear monoatomic and diatomic chains, acoustical and

optical phonons, Dulong and Petit's law, qualitative discussion of Einstein and Debye theories, T^3 law.

Unit – III - Elementary Band Theory (5 Hours)
Qualitative understanding of Kronig and Penny model (without derivation) and formation of bands in solids, concept of effective mass, Hall effect in semiconductor, Hall coefficient, application of Hall Effect, basic introduction to superconductivity

Unit – IV - Magnetic Properties of Matter (6 Hours)
dia-, para-, and ferro- magnetic materials, classical Langevin theory of dia– and para-magnetism (no quantum mechanical treatment), qualitative discussion about Weiss's theory of ferromagnetism and formation of ferromagnetic domains, B-H curve hysteresis and energy loss

Unit – V - Dielectric Properties of Materials (3 Hours)
Polarization, local electric field in solids, electric susceptibility, polarizability, Clausius Mossoti equation, qualitative discussion about ferroelectricity and PE hysteresis loop

References:
Essential Readings:

1) Introduction to Solid State Physics, C. Kittel, 8th edition, 2004, Wiley India Pvt. Ltd.
2) Elements of Solid-State Physics, J. P. Srivastava, 2nd edition, 2006, Prentice-Hall of India
3) Introduction to Solids, L. V. Azaroff, 2004, Tata Mc-Graw Hill
4) Solid State Physics, N. W. Ashcroft and N. D. Mermin, 1976, Cengage Learning
5) Solid State Physics, M. A. Wahab, 2011, Narosa Publications

Additional Readings:

1) Elementary Solid State Physics, M. Ali Omar, 2006, Pearson
2) Solid State Physics, R. John, 2014, McGraw Hill
3) Superconductivity: A Very short Introduction, S. J. Blundell, Audiobook

PRACTICAL COMPONENT

(15 Weeks with 4 hours of laboratory session per week)

At least six experiments to be performed from the following list

1) Measurement of susceptibility of paramagnetic solution (Quinck's tube method)
2) To measure the magnetic susceptibility of solids
3) To determine the coupling coefficient of a piezoelectric crystal
4) To study the dielectric response of materials with frequency
5) To determine the complex dielectric constant and plasma frequency of a metal using Surface Plasmon Resonance (SPR) technique
6) To determine the refractive index of a dielectric layer using SPR technique
7) To study the PE Hysteresis loop of a ferroelectric crystal
8) To draw the BH curve of iron (Fe) using a solenoid and determine the energy loss from hysteresis loop
9) To measure the resistivity of a semiconductor (Ge) crystal with temperature (up to 150° C) by four-probe method and determine its band gap

10) To determine the Hall coefficient of a semiconductor sample
11) Analysis of X-ray diffraction data in terms of unit cell parameters and estimation of particle size
12) Measurement of change in resistance of a semiconductor with magnetic field.

References for laboratory work:

1) Advanced Practical Physics for students, B. L. Flint and H. T. Worsnop, 1971, Asia Publishing House
2) Advanced level Physics Practicals, M. Nelson and J. M. Ogborn, 4th edition, reprinted 1985, Heinemann Educational Publishers
3) Elements of Solid-State Physics, J. P. Srivastava, 2nd edition, 2006, Prentice-Hall of India
4) An Advanced Course in Practical Physics, D. Chattopadhyay and P. C. Rakshit, 2013, New Book Agency (P) Ltd.
5) Practical Physics, G. L. Squires, 4th edition, 2015
6) Practical Physics, C. L. Arora, 19th edition, 2015, S. Chand

DISCIPLINE SPECIFIC ELECTIVE COURSE
WAVES AND OPTICS

Course Title & Code	Credits	Credit distribution of the course			Pre-requisite of the course
		Lecture	Tutorial	Practical	
Waves and Optics	4	2	0	2	--

LEARNING OBJECTIVES

This is a core course in Physics curriculum that begins with explaining ideas of superposition of harmonic oscillations leading to physics of travelling and standing waves. The course also provides an in depth understanding of wave phenomena of light, namely, interference and diffraction with emphasis on practical applications of the same.

LEARNING OUTCOMES

On successfully completing the requirements of this course, the students will have the skill and knowledge to,

- Understand simple harmonic oscillation and superposition principle.
- Understand superposition of a range of collinear and mutually perpendicular simple harmonic motions and their applications.
- Understand concept of normal modes in stationary waves: their frequencies and configurations.
- Understand interference as superposition of waves from coherent sources derived from same parent source.
- Demonstrate understanding of interference experiments: Young's Double Slit, Fresnel's biprism, Llyod's Mirror, Newton's Rings
- Demonstrate basic concepts of diffraction: Superposition of wavelets diffracted from apertures
- Understand Fraunhoffer diffraction from apertures: single slit, double Slit, grating
- Demonstrate fundamental understanding of Fresnel diffraction: Half period zones, diffraction of different apertures
- Laboratory course is designed to understand the principles of measurement and skills in experimental designs.

SYLLABUS

THEORY COMPONENT

Unit – I **(11 Hours)**

Superposition of collinear harmonic oscillations: Simple harmonic motion (SHM); linearity and superposition principle; superposition of two collinear oscillations having (1) equal frequencies and (2) different frequencies (beats).

Superposition of two perpendicular harmonic oscillations: Graphical and analytical methods. Lissajous figures with equal and unequal frequencies and their uses

Superposition of two harmonic Waves: Standing (stationary) waves in a string; normal modes of stretched strings

Unit – II **(8 Hours)**

Interference: Division of amplitude and division of wavefront; Young's double slit experiment: width and shape of fringes; Fresnel's biprism; Lloyd's mirror; 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

Unit – III **(11 Hours)**

Diffraction:

Fraunhofer diffraction: Single slit, double slit, diffraction grating

Fresnel diffraction: Fresnel's assumptions. Fresnel's half-period zones for plane wave. Explanation of rectilinear propagation of light; Fresnel's diffraction pattern of a straight edge, a slit and a wire using half-period zone analysis

References:

Essential Readings:

1) Vibrations and Waves, A. P. French, 1st edition, 2003, CRC press.
2) The Physics of Waves and Oscillations, N. K. Bajaj, 1998, Tata McGraw Hill.
3) Waves: Berkeley Physics Course, vol. 3, Francis Crawford, 2007, Tata McGraw-Hill.
4) Fundamental of Optics, A. Kumar, H. R. Gulati and D. R. Khanna, 2011, R. Chand Publications.
5) Optics, A. Ghatak, 6th edition, 2017, McGraw-Hill Education, New Delhi
6) The Physics of Vibrations and Waves, H. J. Pain, 2013, John Wiley and Sons.

Additional Readings:

1) Principles of Optics, M. Born and E. Wolf, 7th edition, 1999, Pergamon Press.
2) Optics, E. Hecht, 4th edition, 2014, Pearson Education.
3) Fundamentals of Optics, F. A. Jenkins and H. E. White, 1981, McGraw-Hill

PRACTICAL COMPONENT

(15 Weeks with 4 hours of laboratory session per week)

At least 7 experiments to be performed from the following list

1) To determine the frequency of an electric tuning fork by Melde's experiment and verify λ^2–T law.
2) To study Lissajous figures.
3) Familiarization with Schuster`s focusing and determination of angle of prism.
4) To determine refractive index of the material of a prism using sodium light.
5) To determine the dispersive power and Cauchy's constants of the material of a prism using mercury light.
6) To determine wavelength of sodium light using Fresnel biprism.
7) To determine wavelength of sodium light using Newton's rings.
8) To determine the thickness of a thin paper by measuring the width of the interference fringes produced by a wedge-shaped Film.
9) To determine wavelength of (1) Na source and (2) spectral lines of Hg source using plane diffraction grating.

10) To determine dispersive power and resolving power of a plane diffraction grating.

References for laboratory work:

1) Advanced Practical Physics for students, B. L. Flint and H. T. Worsnop, 1971, Asia Publishing House
2) A Text Book of Practical Physics, I. Prakash and Ramakrishna, 11th edition, 2011, Kitab Mahal
3) Advanced level Physics Practicals, M. Nelson and J. M. Ogborn, 4th edition, reprinted 1985, Heinemann Educational Publishers
4) A Laboratory Manual of Physics for undergraduate classes, D. P. Khandelwal, 1985, Vani Pub.
5) B.Sc. Practical Physics, G. Sanon, 2019, R.Chand & Co

DISCIPLINE SPECIFIC ELECTIVE COURSE
ELEMENTS OF MODERN PHYSICS

Course Title & Code	Credits	Credit distribution of the course			Pre-requisite of the course
		Lecture	Tutorial	Practical	
Elements of Modern Physics	4	2	0	2	--

LEARNING OBJECTIVES

This course introduces modern development in Physics. Starting from Planck's law, it develops the idea of probability interpretation and then discusses the formulation of Schrodinger equation. This paper aims to provide knowledge about atomic physics, hydrogen atoms and X-rays. It also introduces concepts of nuclear physics and accelerators.

LEARNING OUTCOMES

After getting exposure to this course, the following topics would be learnt.

- Main aspects of the inadequacies of classical mechanics as well as understanding of the historical development of quantum mechanics. Heisenberg's Uncertainty principle and its applications, photoelectric effect and Compton scattering
- The Schrodinger equation in 1-d, wave function, probability and probability current densities, Normalization, conditions for physical acceptability of wave functions, position and momentum operators and their expectation values. Commutator of position and momentum operators.
- Time Independent Schrodinger Equation, derivation by separation of variables, wave packets, particle in a box problem, energy levels.
- Modification in Bohr's Quantum Model: Sommerfeld theory of elliptical orbits
- Hydrogen atom energy levels and spectra emission and absorption spectra.
- X-rays: their production and spectra: continuous and characteristic X-rays, Moseley Law.
- Basic Properties of Nuclei, nuclear binding energy, semi-empirical mass formula, nuclear force and meson theory.
- Types of Accelerators, Van-de Graaff generator Linear accelerator, Cyclotron, Synchrotrons

SYLLABUS

THEORY COMPONENT

Unit – I - Origin of Quantum Theory **(8 Hours)**

Black Body Radiation and failure of classical theory, Planck's Quantum Hypothesis, Planck's Radiation Law, Quantitative treatment of Photo-electric effect and Compton scattering, Wave properties of particles: de Broglie hypothesis, Group and Phase velocities and relation between them. Heisenberg's Uncertainty Principle, Gamma ray microscope thought experiment, Position -Momentum Uncertainty, consequences of uncertainty principle.

Unit – II - The Schrodinger Equation **(7 Hours)**

The Schrodinger equation in 1-d, statistical interpretation of wave function, probability and probability current densities. Normalization, conditions for physical acceptability of wave functions with examples, position and momentum operators and their expectation values. Commutator of position and momentum operators

Unit – III - Time Independent Schrodinger Equation (5 Hours)

Demonstration of separation of variable method for time independent Schrodinger equation: Free particle wave function, wave packets, application to energy eigen values and stationary states for particle in a box problem, energy levels.

Unit – IV - Atomic Physics (5 Hours)

Beyond the Bohr's Quantum Model: Sommerfeld theory of elliptical orbits
Hydrogen atom energy levels and spectra emission and absorption spectra
Correspondence principle, X-rays: Method of production, X-ray spectra: Continuous and characteristic X-rays, Moseley Law.

Unit – V - Basic Properties of Nuclei (5 Hours)

Introduction (basic idea about nuclear size, mass, angular momentum, spin), semi-empirical mass formula, nuclear force and meson theory
Accelerators: Accelerator facility available in India: Van-de Graaff generator Linear accelerator, Cyclotron, (Principle, construction, working, advantages and disadvantages). Discovery of new elements of the periodic table

References:

Essential Readings:

1) Concepts of Modern Physics, A. Beiser, 2002, McGraw-Hill.
2) Modern Physics, R. A. Serway, C. J. Moses and C. A. Moyer, 2012, Thomson Brooks Cole Cengage
3) Schaum's Outline of Modern Physics, R. Gautreau and W. Savin, 2020, McGraw Hill LLC
4) Modern Physics for Scientists and Engineers, S. T. Thornton Rex, 4th edition, 2013, Cengage Learning
5) Introduction to Modern Physics, R. Meyer, Kennard, Coop, 2002, Tata McGraw Hill
6) Physics for scientists and Engineers with Modern Physics, Jewett and Serway, 2010.
7) Learning Modern Physics, G. Kaur and G.R. Pickrell, 2014, McGraw Hill.
8) Modern Physics, R. Murugeshan, S Chand & Co. Ltd
9) Schaum's Outline of Beginning Physics II | Waves, electromagnetism, Optics and Modern Physics, A. Halpern, E. Erlbach, McGraw Hill.
10) Theory and Problems of Modern Physics, Schaum's outline, R. Gautreau and W.Savin, 2nd edition, Tata McGraw-Hill Publishing Co. Ltd.
11) Quantum Physics, Berkeley Physics, Vol.4. E. H. Wichman, 1971, Tata McGraw-Hill Co.
12) Quantum Mechanics: Theory and Applications, A. Ghatak and S. Lokanathan, 2004, Macmillan Publishers India Limited.
13) Introduction to Quantum Mechanics, D. J. Griffith, 2005, Pearson Education.
14) Concepts of nuclear physics, B. Cohen, McGraw-Hill Education
15) Atomic Physics, Ghoshal, 2007, S. Chand Publishing House.
16) Atomic Physics, J. B. Rajam, 1980, Chand Publisher
17) Nuclear Physics, S. N. Ghoshal, S. Chand Publishers
18) Atomic and Molecular Physics, R. Kumar, RBSA PUBLISHERS.

Additional Readings:

1) Six Ideas that Shaped Physics: Particles Behave like Waves, T. A. Moore, 2003, McGraw Hill.
2) Thirty years that shook physics: The story of quantum theory, G. Gamow, Garden City, NY: Doubleday, 1966.

PRACTICAL COMPONENT

(15 Weeks with 4 hours of laboratory session per week)

Mandatory activity:

- Sessions on the review of experimental data analysis, sources of error and their estimation in detail, writing of scientific laboratory reports including proper reporting of errors.
- Application to the specific experiments done in the lab
- Familiarization with Schuster`s focusing; determination of angle of prism.

At least six experiments to be performed from the following list

1) Measurement of Planck's constant using black body radiation and photo-detector.
2) Photo-electric effect: photo current versus intensity and wavelength of light, maximum energy of photo-electrons versus frequency of light.
3) To determine the work function of material of filament of directly heated vacuum diode.
4) To determine the Planck's constant using LEDs of at least 4 different colours.
5) To determine the wavelength of the H-alpha emission line of Hydrogen atoms.
6) To determine the ionization potential of mercury.
7) To determine the value of e/m by (a) Magnetic focusing or (b) Bar magnet.
8) To show the tunneling effect in tunnel diodes using I-V characteristics.
9) To determine the wavelength of a laser source using diffraction of a single slit.
10) To determine the wavelength of a laser source using diffraction of double slits.
11) To determine angular spread of He-Ne laser using plane diffraction grating
12) One innovative experiment designed by the teacher relevant to the syllabus.

References for laboratory work:

1) Advanced Practical Physics for students, B. L. Flint and H. T. Worsnop, 1971, Asia Publishing House.
2) A Text Book of Practical Physics, I. Prakash and Ramakrishna, 11th edition, 2011, Kitab Mahal.
3) Advanced level Physics Practicals, M. Nelson and J. M. Ogborn, 4th edition, reprinted, 1985, Heinemann Educational Publishers.
4) A Laboratory Manual of Physics For Undergraduate Classes, D. P. Khandelwal, 1985,Vani Publisher.
5) B. Sc. Practical Physics, H. Singh, S Chand & Co Ltd
6) B.Sc. Practical Physics, G. Sanon, R. Chand and Co.

DISCIPLINE SPECIFIC ELECTIVE COURSE
QUANTUM MECHANICS

Course Title & Code	Credits	Credit distribution of the course			Pre-requisite of the course
		Lecture	Tutorial	Practical	
Quantum Mechanics	4	2	0	2	Elements of Modern Physics paper of this course or its equivalent

LEARNING OBJECTIVES

The development of quantum mechanics has revolutionized the human life. In this course, the students will be exposed to the probabilistic concepts of basic non-relativistic quantum mechanics and its applications to understand the sub atomic world.

LEARNING OUTCOMES

After completing this course, the students will be able to

- Learn the methods to solve time-dependent and time-independent Schrödinger equation.
- Characteristics of an acceptable wave function for any sub atomic particle in various potentials.
- Applications of the Schrodinger equation to different cases of potentials namely infinite and finite potential well, step potential, rectangular potential barrier, harmonic oscillator potential.
- Learn effect of magnetic field on atom, calculation of magnetic moment, basic theory of Stern Gerlach experiment, splitting of lines and energy levels, and various coupling schemes
- In the laboratory course, the students will be able to use computational methods to
    - Solve Schrödinger equation for ground state energy and wave functions of various simple quantum mechanical one- dimensional potentials
    - Solve Schrödinger equation for ground state energy and radial wave functions of some central potentials.

SYLLABUS

THEORY COMPONENT

Unit – I **(10 Hours)**

General discussion of bound states in an arbitrary potential: Review of Schrodinger wave equation, Continuity of wave function, boundary conditions and emergence of discrete energy levels. Application to energy eigen states for a particle in a finite square potential well, reflection and transmission across step potential and rectangular potential barrier.

Unit – II **(10 Hours)**

Harmonic oscillator: Energy eigen values and eigen states of a 1-D harmonic oscillator using

algebraic method (ladder operators) and using Hermite polynomials. Zero point energy and uncertainty principle. Applications to various kinds of wavefunctions

Unit – III **(10 Hours)**

Atoms in Electric and Magnetic Fields: Electron angular momentum, Angular momentum quantization. Electron Spin and Spin Angular Momentum. Larmor's Theorem. Spin Magnetic Moment. Stern-Gerlach Experiment. Normal Zeeman Effect: Electron Magnetic Moment and Magnetic Energy. Pauli Exclusion Principle. Symmetric and Antisymmetric Wave Functions. Spin orbit coupling. Spectral Notations for Atomic States, Total angular momentum, Spin-orbit coupling in atoms-L-S and J-J couplings.

References:

Essential Readings:

1) Quantum Mechanics: Theory and Applications, A. Ghatak and S. Lokanathan, 6th edition, 2019, Laxmi Publications, New Delhi.
2) Introduction to Quantum Mechanics, D. J. Griffith, 2nd edition, 2005, Pearson Education.
3) A Text book of Quantum Mechanics, P. M. Mathews and K. Venkatesan, 2nd edition, 2010, McGraw Hill.
4) Quantum Mechanics, B. H. Bransden and C. J. Joachain, 2nd edition, 2000, Prentice Hall
5) Quantum Mechanics: Concepts and Applications, 2nd edition, N. Zettili, A John Wiley and Sons, Ltd., Publication
6) Atomic Physics, S. N. Ghoshal, 2010, S. Chand and Company

Additional Readings:

1) Quantum Mechanics for Scientists & Engineers, D. A. B. Miller, 2008, Cambridge University Press.
2) Introduction to Quantum Mechanics, R. H. Dicke and J. P. Wittke, 1966, Addison-Wesley Publications
3) Quantum Mechanics, L. I. Schiff, 3rd edition, 2010, Tata McGraw Hill.
4) Quantum Mechanics, R. Eisberg and R. Resnick, 2nd edition, 2002, Wiley.
5) Quantum Mechanics, B. C. Reed, 2008, Jones and Bartlett Learning.
6) Quantum Mechanics, W. Greiner, 4th edition, 2001, Springer.
7) Introductory Quantum Mechanics, R. L. Liboff, 4th edition, 2003, Addison Wesley

PRACTICAL COMPONENT

(15 Weeks with 4 hours of laboratory session per week)

At least 6 programs must be attempted. The implementation may be done in Python/C++/Scilab. Use of available library functions may be encouraged. Similar programs may be added.

Unit 1

1) Visualize the spherical harmonics by plotting the probability density for various values of the quantum numbers (*l, m*).
2) Use the analytical solution for a particle in finite potential well. Numerically solve the transcendental equation one gets after putting the continuity and boundary conditions to determine the energy eigenvalues for various values of the potential width and depth. Plot the corresponding normalised eigenfunctions.

Unit 2

Solve the Schrödinger equation using shooting/finite difference or any other method for the following simple 1-D potentials and compare with the analytical solutions:

1) Particle in a box
2) Particle in a finite potential well
3) Harmonic Potential

Unit 3

Solve the s-wave Schrodinger equation

$$\frac{d^2u}{dr^2} = A(r)u(r), A(r) = \frac{2m}{\hbar^2}[V(r) - E],$$

for the following cases:

1) Ground state and the first excited state of the hydrogen atom:

$$V(r) = \frac{-e^2}{r}$$

where m is the reduced mass of the electron. Obtain the energy eigenvalues and plot the corresponding wavefunctions. Remember that the ground state energy of the hydrogen atom is ≈ -13.6 eV. Take e = 3.795 $(eVÅ)^{1/2}$, ħc = 1973 (eVÅ) and m = 0.511x10^6 eV/c^2.

2) For an atom in the screened coulomb potential

$$V(r) = \frac{-e^2}{r}e^{-r/a}$$

where m is the reduced mass of the system (which can be chosen to be the mass of an electron). Find the energy (in eV) of the ground state of the atom to an accuracy of three significant digits. Also, plot the corresponding wavefunction. Take e = 3.795 $(eVÅ)^{1/2}$, m = 0.511x10^6 eV/c^2, and a = 3 Å, 5 Å, 7 Å. In these units ħc = 1973 (eVÅ). The ground state energy is expected to be above -12 eV in all three cases.

Unit 4

Solve the s-wave Schrodinger equation $\frac{d^2u}{dr^2} = A(r)u(r), A(r) = \frac{2m}{\hbar^2}[V(r) - E]$, for a particle of mass m for the following cases

1) Anharmonic oscillator potential

$$V(r) = \frac{1}{2}kr^2 + \frac{1}{3}br^3$$

for the ground state energy (in MeV) of particle to an accuracy of three significant digits. Also, plot the corresponding wave function. Choose m = 940 MeV/c^2, k = 100 MeV fm^{-2}, b= 0, 10, 30 MeV fm^{-3}. In these units, $c\hbar$ = 197.3 MeV fm. The ground state energy is expected to lie between 90 and 110 MeV for all three cases.

2) For the vibrations of hydrogen molecule with Morse potential

$$V(r) = D(e^{-2ar'} - e^{-ar'}), r' = \frac{r - r_0}{r}$$

Here m is the reduced mass of the two-atom system for the Morse potential
Find the lowest vibrational energy (in MeV) of the molecule to an accuracy of three significant digits. Also plot the corresponding wave function.
Take: m = 940 x10^6 eV/c^2, D = 0.755501 eV, α = 1.44, r_0 = 0.131349 Å

Solve the hydrogen atom Schrodinger equation for an external electric field of E=10^9 eV/cm. The additional term in the Hamiltonian will be eEz .

Laboratory based experiments (Optional):

1) Study of Electron spin resonance- determine magnetic field as a function of the resonance frequency
2) Study of Zeeman effect: with external magnetic field; Hyperfine splitting
3) Quantum efficiency of CCD

References for laboratory work:

1) Schaum's Outline of Programming with C++, J. Hubbard, 2000, McGraw-Hill Education.
2) C++ How to Program, P. J. Deitel and H. Deitel, 2016, Pearson
3) Scilab (A Free Software to Matlab): H. Ramchandran, A. S. Nair, 2011, S. Chand and Co
4) Documentation at the Python home page (https://docs.python.org/3/) and the tutorials there (https://docs.python.org/3/tutorial/).
5) Documentation of NumPy and Matplotlib: https://numpy.org/doc/stable/user/ and https://matplotlib.org/stable/tutorials/
6) Computational Physics, Darren Walker, 1st edition, 2015, Scientific International Pvt. Ltd
7) An Introduction to Computational Physics, T. Pang, 2010, Cambridge University Press

DISCIPLINE SPECIFIC ELECTIVE COURSE
MATHEMATICAL PHYSICS-I

Course Title & Code	Credits	Credit distribution of the course			Pre-requisite of the course
		Lecture	Tutorial	Practical	
Mathematical Physics-I	4	3	1	0	--

LEARNING OBJECTIVES

The emphasis of course is to equip students with the mathematical tools required in solving problem of interest to physicists. The mathematical tools learned by students will help them develop critical skills and knowledge that will prepare them not only for doing fundamental and applied research but also for a wide variety of careers.

LEARNING OUTCOMES

After completing this course, students will be able to,

- Apply the concepts of calculus to the functions of more than one variable.
- Understand the concepts of vector calculus and apply them to the physics problems.
- Represent a periodic function by a sum of harmonics using Fourier series.
- Obtain power series solution of differential equation of 2^{nd} order with variable coefficients using Frobenius method.
- Understand special functions.

SYLLABUS

THEORY COMPONENT

Unit – I **(18 Hours)**

Calculus of functions of more than one variable: Functions of several variables, Limits and continuity, partial derivatives, chain rule for partial derivatives, exact and inexact differentials. Taylor's series of a function of two variables. Maxima and minima, constrained extrema using Lagrange Multipliers.

Vector Calculus: Scalar and vector fields, directional derivative gradient of a scalar field and its geometrical interpretation. Divergence and curl of a vector field and their physical interpretation. Laplacian operator. Vector identities.

Integrals of vector-valued functions of single scalar variable. Multiple integrals, Jacobian, Notion of infinitesimal line, surface and volume elements. Line, surface and volume integrals of vector fields. Flux of a vector field. Gauss divergence theorem, Green's and Stokes' Theorems (no proofs) and their applications.

Unit – II **(12 Hours)**

Fourier series: Periodic functions. Orthogonality of sine and cosine functions, Dirichlet Conditions (Statement only). Expansion of periodic functions in a series of sine and cosine

functions and determination of Fourier coefficients. Even and odd functions and their Fourier expansions. Parseval's Identity. Application: Summing of Infinite Series.

Unit – III **(15 Hours)**

Frobenius method and special functions: Singular Points of Second Order Linear Differential Equations and their importance. Frobenius method and its applications to differential equations. Legendre Differential Equation and its solution. Properties of Legendre Polynomials: Rodrigues Formula, Orthogonality. Recurrence relations.

References:

Essential Readings:

1) Mathematical methods for Scientists and Engineers, D.A. McQuarrie, 2003, Viva Book.
2) Advanced Engineering Mathematics, E. Kreyszig, 2008, Wiley India.
3) Fourier analysis: With Applications to Boundary Value Problems, M. Spiegel, 2017, McGraw Hill Education
4) Essential mathematical methods, K. F. Riley and M. P. Hobson, 2011, Cambridge Univ. Press.
5) Vector Analysis, M. Spiegel, 2nd edition, 2017, Schaum's outlines series.

Additional Readings:

1) Mathematical Methods for Physicists, G. B. Arfken, H. J. Weber and F. E. Harris, 7th edition, 2013, Elsevier.
2) Introduction to Electrodynamics, Chapter 1, D. J. Griffiths, 4th edition, 2017, Cambridge University Press.
3) Advanced Engineering Mathematics, D. G. Zill and W. S. Wright, 5th edition, 2012, Jones and Bartlett Learning.
4) Introduction to Vector Analysis, Davis and Snider, 6th edition, 1990, McGraw Hill.
5) Differential Equations, G. F. Simmons, 2007, McGraw Hill.
6) Mathematical Physics, A. K. Ghatak, I. C. Goyal and S. J. Chua, 2017, Laxmi Publications Private Limited

DISCIPLINE SPECIFIC ELECTIVE COURSE
MATHEMATICAL PHYSICS-II

Course Title & Code	Credits	Credit distribution of the course			Pre-requisite of the course
		Lecture	Tutorial	Practical	
Mathematical Physics-II	4	3	1	0	Mathematics as Discipline Specific Core paper containing Linear Algebra and Calculus.

LEARNING OBJECTIVES

The emphasis of course is to equip students with the mathematical tools required in solving problem of interest to chemists. The mathematical tools might be building blocks to understand the fundamental computational skills and hence enable them to solve a wide range of physics as well as chemistry problems. Overall, to help students develop critical skills and knowledge that will prepare them not only for doing fundamental and applied research but also prepare them for a wide variety of careers.

LEARNING OUTCOMES

After completing this course, students will be able to,

- Determine continuity, differentiability and analyticity of a complex function, find the derivative of a function and understand the properties of elementary complex functions.
- Evaluate a contour integral, fundamental theorem of calculus and Cauchy's integral formula.
- Find the residues and use the residue theorem to evaluate a contour integral and real integral.
- Learn Fourier Transforms (FTs) and their applications.

SYLLABUS

THEORY COMPONENT

Unit – I **(25 Hours)**

Complex Analysis:

Complex functions and mappings. Limits of complex functions. Continuity and differentiability of a complex function, Cauchy-Riemann equations, sufficient conditions for differentiability. Analytic functions, singular points. Elementary functions.

Integration in complex plane: contours and contour integrals, Cauchy-Goursat Theorem (No proof) for simply and multiply connected domains. Cauchy's Inequality. Cauchy's Integral formula. Taylor's and Laurent's theorems (statements only), types of singularities (removable, poles and essential), residues and Cauchy's residue theorem. Evaluation of real integrals by contour integration (excluding integrands with branch points).

Unit – II **(15 Hours)**

Fourier Transforms (FTs): Fourier Integral Theorem. Sine and Cosine Transforms. Properties of FTs: (1) FTs of Derivatives of Functions, (2) Change of Scale Theorem, (3) FTs of Complex Conjugates of Functions, (4) Shifting Theorem, (5) Modulation Theorem, (6) Convolution Theorems, and (7) Parseval's Identity.

Solution of First and Second Order ODEs by using FTs.

Unit – III **(5 Hours)**

Some Special Integrals: Beta and Gamma Functions and Relation between them. Expression of Integrals in terms of Gamma Functions.

References:

Essential Readings:

1) Mathematical Methods in the Physical Sciences, M. L. Boas, 3rd edition, 2007, Wiley India
2) Advanced Engineering Mathematics, E. Kreyszig, 2008, Wiley India
3) Theory and Problems of Linear Algebra, S. Lipschutz, 1987, McGraw-Hill Inc.
4) Mathematical Methods for Physicists, H. J. Weber and G. B. Arfken, 2010, Elsevier.
5) Introduction to Matrices and Linear Transformations, D. T. Finkbeiner, 1978, Dover Publication.
6) Matrices and tensors in Physics: A.W. Joshi, 2017, New Age International Pvt.

Additional Readings:

1) Mathematical Tools for Physics, J. Nearing, 2010, Dover Publications.
2) Elementary Linear Algebra, Applications Version, H. Anton and C. Rorres, Wiley Student edition.
3) Mathematics for Physicists, S. M. Lea, 2004, Thomson Brooks/Cole.
4) An Introduction to Linear Algebra and Tensors, M. A. Akivis, V. V. Goldberg, Richard and Silverman, 2012, Dover Publications

DISCIPLINE SPECIFIC ELECTIVE COURSE
ELECTRICITY AND MAGNETISM

Course Title & Code	Credits	Credit distribution of the course			Pre-requisite of the course
		Lecture	Tutorial	Practical	
Electricity and Magnetism	4	2	0	2	Physics and Mathematics syllabus of class XII

LEARNING OBJECTIVES

This course reviews the concepts of electricity and magnetism learnt at school from a more advanced perspective and goes on to build new concepts. The course covers static and dynamic electric and magnetic fields, and the principles of electromagnetic induction. It also includes analysis of electrical circuits and introduction of network theorems. The students will be able to apply the concepts learnt to several real world problems.

LEARNING OUTCOMES

At the end of this course, students will be able to,

- Understand Gauss' law, Coulomb's law for the electric field, and apply them to systems of point charges as well as line, surface, and volume distributions of charges. Also to use the knowledge to solve some simple problems
- Express electric current and capacitance in terms of electric field and electric potential.
- Calculate the force experienced by a moving charge in a magnetic field
- To determine the magnetic force generated by a current carrying conductor
- Have brief idea of magnetic materials, understand the concept of electromagnetic induction, solve problems using Faraday's and Lenz's laws
- In the laboratory course, students will be able to measure resistance (high and low), voltage, current, self and mutual inductance, capacitor, strength of magnetic field and its variation, study different electric circuits.

SYLLABUS

THEORY COMPONENT

Unit – I - Electrostatics **(10 Hours)**

Electric field, electric flux, Gauss' theorem in electrostatics, applications of Gauss' theorem (linear, plane and spherical charge distribution), divergence and curl of electric field, electric field as negative gradient of the potential, line integral of electric field, electric field of a dipole and charged disc, capacitance due to parallel plates and spherical condenser. Electrostatic energy of system of charge (charged sphere), dielectric medium, dielectric polarization, displacement vector, Gauss' theorem in dielectrics, parallel plate capacitor filled with dielectric.

Unit – II - Magnetostatics **(8 Hours)**

Magnetic force between current elements and definition of magnetic field B, Biot-Savart's law and its applications (current carrying straight conductor, current carrying circular coil,

current carrying solenoid), divergence and curl of magnetic field, Ampere's circuital law, magnetic properties of materials (magnetic intensity, magnetic induction, permeability, magnetic susceptibility), brief introduction of dia-, para- and ferro magnetic materials

Unit – III - Electromagnetic Induction (7 Hours)

Faraday's laws of electromagnetic induction, Lenz's law, self-inductance of single coil,mutual inductance of two coils, energy stored in magnetic field. Maxwell`s equations and equation of continuity of current, displacement current

Unit – IV - Electrical Circuits (5 Hours)

DC Circuits: Review of Kirchhoff's Voltage and Current Laws, Thevenin theorem, Norton theorem, Superposition theorem, Maximum Power Transfer theorem.

References:

Essential Readings:

1) Fundamentals of Electricity and Magnetism, A. F. Kip, 2nd edition, 1981, McGraw-Hill.
2) Electricity and Magnetism, J. H. Fewkes and J. Yarwood, Vol. I, 1991, Oxford Univ. Press
3) Electricity and Magnetism, D. C. Tayal, 1988, Himalaya Publishing House.
4) Fundamentals of Electromagnetics, M. A. W. Miah, 1982, Tata McGraw Hill
5) Introduction to Electrodynamics, D.J. Griffiths, 3rd edition, 1998, Benjamin Cummings.

Additional Readings:

1) Electricity and Magnetism, Berkeley Physics Course, E. M. Purcell, 1986, McGraw-Hill Education.
2) University Physics, R. L. Reese, 2003, Thomson Brooks/Cole.
3) Problems and Solutions in Electromagnetics, A. Ghatak, K. Thyagarajan and R. Varshney.
4) Schaum's Outline of Electric Circuits, J. Edminister and M. Nahvi, 3rd edition, 1995, McGraw Hill.

PRACTICAL COMPONENT

Mandatory training:

- Measuring resistances, a.c and d.c voltages, d.c. current, capacitance using multimeter.
- Working of various instruments and circuits related to different experiments.
- Knowledge of recording and analyzing experimental data.

At least six experiments to be performed from the following list

1) Ballistic Galvanometer:
    a. Measurement of charge and current sensitivity
    b. Measurement of critical damping resistance
    c. Determine a high resistance by leakage method
    d. Determine self-inductance of a coil by Rayleigh's method.
2) To compare capacitances using de Sauty's bridge.
3) Measurement of field strength B and its variation in a solenoid
4) To study the characteristics of a series RC Circuit.

5) To study a series LCR circuit and determine its resonant frequency and quality factor.
6) To study a parallel LCR circuit and determine its anti-resonant frequency and quality factor
7) To determine a low resistance by Carey Foster bridge.
8) To verify the Thevenin, superposition and maximum power transfer theorems
9) To verify Norton theorem

References for laboratory work:

1) Advanced Practical Physics for Students, B. L. Flint and H. T. Worsnop, 1971, Asia Publishing House.
2) Engineering Practical Physics, S. Panigrahi and B. Mallick, 2015, Cengage Learning India Pvt. Ltd.
3) A Textbook of Practical Physics, I. Prakash and Ramakrishna, 11th edition, 2011, Kitab Mahal, New Delhi.
4) Practical Physics, G. L. Squires, 4th edition, 2015, Cambridge University Press
5) Advanced level Physics Practicals, M. Nelson and J. M. Ogborn, 4th edition, reprinted 1985, Heinemann Educational Publishers

ANNEXURE-2

SEMESTER-IV/V
INDUSTRIAL CHEMISTRY

DISCIPLINE SPECIFIC CORE COURSE
THERMAL PHYSICS AND STATISTICAL MECHANICS

Course Title & Code	Credits	Credit distribution of the course			Pre-requisite of the course
		Lecture	Tutorial	Practical	
Thermal Physics and Statistical Mechanics	**4**	**2**	**0**	**2**	--

LEARNING OBJECTIVES

This course will review the basic concepts of thermodynamics, kinetic theory of gases with a brief introduction to statistical mechanics. The primary goal is to make the student understand the applications of fundamental laws of thermodynamics to various systems and processes. This coursework will enable the students to understand the connection between the macroscopic observations of physical systems and microscopic behaviour of atoms and molecule through a brief knowledge of statistical mechanics. The laboratory course deals with providing the knowledge of the concepts of thermodynamics along with Planck's law and Stefan Boltzmann laws related to black body radiation.

LEARNING OUTCOMES

At the end of this course, students will be able to,

- Get an essence of the basic concepts of thermodynamics, the first and the second law of thermodynamics, the concept of entropy and the associated theorems, the thermodynamic potentials and their physical interpretations along with Maxwell's thermodynamic relations.
- Know the fundamentals of the kinetic theory of gases, Maxwell-Boltzman distribution law, mean free path of molecular collisions, viscosity, thermal conductivity and diffusion.
- Learn about the black body radiations, Stefan- Boltzmann's law, Rayleigh-Jean's law and Planck's law and their significances.
- Gain the basic knowledge about quantum statistics: the Bose-Einstein statistics and the Fermi-Dirac statistics.
- In the laboratory course, the students are expected to: Measure of Planck's constant using black body radiation, determine Stefan's Constant, coefficient of thermal conductivity of a bad conductor and a good conductor, determine the temperature coefficient of resistance, study variation of thermo-emf across two junctions of a thermocouple with temperature etc.

SYLLABUS

THEORY COMPONENT

Unit – I **(11 Hours)**

Laws of Thermodynamics: Fundamental basics of thermodynamic system and variables, zeroth law of thermodynamics and temperature, first law and internal energy, various thermodynamical processes, applications of first law: general relation between C_P and C_V, work done during various processes, compressibility and expansion coefficient, reversible and irreversible processes, second law: Kelvin-Planck and Clausius statements, Carnot engine, Carnot cycle and theorem, basic concept of entropy, entropy changes in reversible and irreversible processes, Clausius inequality, entropy-temperature diagrams.

Unit – II **(5 Hours)**

Thermodynamic potentials and Maxwell's relations: Basic concept of thermodynamic potentials, internal energy, enthalpy, Helmholtz free energy, Gibb's free energy, derivation of Maxwell's thermodynamic relations and their applications in Clausius Clapeyron equation, value of $C_P - C_V$, TdS equations, evaluation of C_P/C_V

Unit – III **(6 Hours)**

Kinetic Theory of Gases and Molecular Collisions: Maxwell-Boltzmann law of distribution of velocities in an ideal gas and its experimental verification, Mean, Root Mean Square and Most Probable Speeds, Mean Free Path (Zeroth order only)

Unit – IV **(4 Hours)**

Theory of Radiation: Blackbody radiation, spectral distribution, derivation of Planck's law, idea about Wein's law, Rayleigh-Jeans law, Stefan Boltzmann law and Wien's displacement law (derivation not required)

Unit – V **(4 Hours)**

Statistical Mechanics: Macrostate and Microstate, phase space, entropy and thermodynamic probability, Maxwell-Boltzmann law, qualitative description of quantum statistics – Bose Einstein and Fermi Dirac, comparison of three statistics.

References:

Essential Readings:

1) Heat and Thermodynamics, M. W. Zemansky and R. Dittman, 1981, Tata McGraw-Hill.
2) Thermal Physics, S. C. Garg, R. M. Bansal and C. K. Ghosh, 2nd edition, Tata McGraw-Hill.
3) Thermodynamics, Kinetic Theory and Statistical Thermodynamics, Sears and Salinger, 1988, Narosa.
4) Concepts in Thermal Physics, Blundell and Blundell, 2nd edition, 2009, Oxford University Press.
5) Thermal Physics, A. Kumar and S. P. Taneja, 2014, R. Chand Publications.
6) A Text Book of Heat and Thermodynamics for Degree Students, J. B Rajam, 1981, S. Chand.
7) Statistical Physics : Berkley Physics Course, F. Reif, Mc Graw Hill

Additional Readings:

1) An Introduction to Thermal Physics, D. Schroeder, 2021, Oxford University Press (earlier

published by Pearsons).
2) Thermal Physics: C. Kittel and H. Kroemer, 1980, 2nd edition
3) Heat, Thermodynamics and Statistical Physics, B. Lal, N. Subrahmanyam and P. S. Hemne, S. Chand and Company

PRACTICAL COMPONENT

(15 Weeks with 4 hours of laboratory session per week)

At least 6 experiments to be performed from the following list

1) To determine mechanical equivalent of heat, J, by Callender and Barne's constant flow method.
2) To determine the coefficient of thermal conductivity of Cu by Searle's apparatus.
3) To determine the coefficient of thermal conductivity of a bad conductor by Lee and Charlton's disc method using steam or electrical heating.
4) Measurement of Planck's constant using black body radiation.
5) To determine the temperature coefficient of resistance by Platinum Resistance Thermometer by Carey Foster's Bridge
6) To study the variation of thermos-emf across two junctions of a thermocouple with temperature.
7) To determine Stefan's constant.
8) To determine the temperature coefficient of resistance using Platinum Resistance Thermometer using Callender and Griffith Bridge.

References for laboratory work:

1) Advanced Practical Physics for students: B. L. Flint and H. T.Worsnop, 1971, Asia Publishing House.
2) A Text Book of Practical Physics: I. Prakash and Ramakrishna, 11th edition, Kitab Mahal
3) Advanced level Practical Physics, Nelkon and Ogborn, 4th edition, reprinted 1985, Heinemann Educational Publishers.
4) An Advanced Course in Practical Physics, D. Chattopadhyay and P. C. Rakshit, 1990, New Central Book Agency.
5) Practical Physics, G. L. Squires, 1985, Cambridge University Press.
6) B.Sc. Practical Physics, H. Singh and P.S. Hemne, revised edition 2011, S. Chand and Co.
7) B.Sc. Practical Physics, C. L. Arora, 2001, S. Chand and Co.
8) B.Sc. Practical Physics, G. Sanon, R. Chand and Co.

POOL OF DSEs

DISCIPLINE SPECIFIC ELECTIVE COURSE
SOLID STATE PHYSICS

Course Title & Code	Credits	Credit distribution of the course			Pre-requisite of the course
		Lecture	Tutorial	Practical	
Solid State Physics	4	2	0	2	Understanding of basic concepts of Physics

LEARNING OBJECTIVES

This course introduces the basic concepts and principles required to understand the various properties exhibited by condensed matter, especially solids. It enables the students to appreciate how the interesting and wonderful properties exhibited by matter depend upon its atomic and molecular constituents. It also communicates the importance of solid state physics in modern society.

LEARNING OUTCOMES

On successful completion of the module students should be able to,

- Elucidate the concept of lattice, crystals and its planes
- Understand the elementary lattice dynamics and its influence on the properties of materials
- Understanding about origin of energy bands, and their influence on electronic behaviour
- Explain the origin of dia-, para-, and ferro-magnetic properties of solids
- Explain the origin of the dielectric properties exhibited by solids and the concept of polarizability
- In the laboratory students will carry out experiments based on the theory that they have learned to measure the magnetic susceptibility, dielectric constant, trace hysteresis loop. They will also employ to four probe methods to measure electrical conductivity and the hall set up to determine the hall coefficient of a semiconductor.

SYLLABUS

THEORY COMPONENT

Unit – I - Crystal Structure **(10 Hours)**

Solids: Amorphous and Crystalline Materials, Lattice Translation Vectors, Lattice with a Basis, Unit Cell, Types of lattices, Miller Indices, Reciprocal Lattice, Ewald's construction (geometrical approach) Brillouin Zones, Diffraction of X-rays by Crystals, Bragg's Law

Unit – II - Elementary Lattice Dynamics **(6 Hours)**

Lattice vibrations and phonons: linear monoatomic and diatomic chains, acoustical and

optical phonons, Dulong and Petit's law, qualitative discussion of Einstein and Debye theories, T^3 law.

Unit – III - Elementary Band Theory (5 Hours)
Qualitative understanding of Kronig and Penny model (without derivation) and formation of bands in solids, concept of effective mass, Hall effect in semiconductor, Hall coefficient, application of Hall Effect, basic introduction to superconductivity

Unit – IV - Magnetic Properties of Matter (6 Hours)
dia-, para-, and ferro- magnetic materials, classical Langevin theory of dia– and para-magnetism (no quantum mechanical treatment), qualitative discussion about Weiss's theory of ferromagnetism and formation of ferromagnetic domains, B-H curve hysteresis and energy loss

Unit – V - Dielectric Properties of Materials (3 Hours)
Polarization, local electric field in solids, electric susceptibility, polarizability, Clausius Mossoti equation, qualitative discussion about ferroelectricity and PE hysteresis loop

References:
Essential Readings:

1) Introduction to Solid State Physics, C. Kittel, 8th edition, 2004, Wiley India Pvt. Ltd.
2) Elements of Solid-State Physics, J. P. Srivastava, 2nd edition, 2006, Prentice-Hall of India
3) Introduction to Solids, L. V. Azaroff, 2004, Tata Mc-Graw Hill
4) Solid State Physics, N. W. Ashcroft and N. D. Mermin, 1976, Cengage Learning
5) Solid State Physics, M. A. Wahab, 2011, Narosa Publications

Additional Readings:

1) Elementary Solid State Physics, M. Ali Omar, 2006, Pearson
2) Solid State Physics, R. John, 2014, McGraw Hill
3) Superconductivity: A Very short Introduction, S. J. Blundell, Audiobook

PRACTICAL COMPONENT

(15 Weeks with 4 hours of laboratory session per week)

At least six experiments to be performed from the following list

1) Measurement of susceptibility of paramagnetic solution (Quinck's tube method)
2) To measure the magnetic susceptibility of solids
3) To determine the coupling coefficient of a piezoelectric crystal
4) To study the dielectric response of materials with frequency
5) To determine the complex dielectric constant and plasma frequency of a metal using Surface Plasmon Resonance (SPR) technique
6) To determine the refractive index of a dielectric layer using SPR technique
7) To study the PE Hysteresis loop of a ferroelectric crystal
8) To draw the BH curve of iron (Fe) using a solenoid and determine the energy loss from hysteresis loop
9) To measure the resistivity of a semiconductor (Ge) crystal with temperature (up to 150° C) by four-probe method and determine its band gap

10) To determine the Hall coefficient of a semiconductor sample
11) Analysis of X-ray diffraction data in terms of unit cell parameters and estimation of particle size
12) Measurement of change in resistance of a semiconductor with magnetic field.

References for laboratory work:

1) Advanced Practical Physics for students, B. L. Flint and H. T. Worsnop, 1971, Asia Publishing House
2) Advanced level Physics Practicals, M. Nelson and J. M. Ogborn, 4th edition, reprinted 1985, Heinemann Educational Publishers
3) Elements of Solid-State Physics, J. P. Srivastava, 2nd edition, 2006, Prentice-Hall of India
4) An Advanced Course in Practical Physics, D. Chattopadhyay and P. C. Rakshit, 2013, New Book Agency (P) Ltd.
5) Practical Physics, G. L. Squires, 4th edition, 2015
6) Practical Physics, C. L. Arora, 19th edition, 2015, S. Chand

DISCIPLINE SPECIFIC ELECTIVE COURSE
WAVES AND OPTICS

Course Title & Code	Credits	Credit distribution of the course			Pre-requisite of the course
		Lecture	Tutorial	Practical	
Waves and Optics	4	2	0	2	--

LEARNING OBJECTIVES

This is a core course in Physics curriculum that begins with explaining ideas of superposition of harmonic oscillations leading to physics of travelling and standing waves. The course also provides an in depth understanding of wave phenomena of light, namely, interference and diffraction with emphasis on practical applications of the same.

LEARNING OUTCOMES

On successfully completing the requirements of this course, the students will have the skill and knowledge to,

- Understand simple harmonic oscillation and superposition principle.
- Understand superposition of a range of collinear and mutually perpendicular simple harmonic motions and their applications.
- Understand concept of normal modes in stationary waves: their frequencies and configurations.
- Understand interference as superposition of waves from coherent sources derived from same parent source.
- Demonstrate understanding of interference experiments: Young's Double Slit, Fresnel's biprism, Llyod's Mirror, Newton's Rings
- Demonstrate basic concepts of diffraction: Superposition of wavelets diffracted from apertures
- Understand Fraunhoffer diffraction from apertures: single slit, double Slit, grating
- Demonstrate fundamental understanding of Fresnel diffraction: Half period zones, diffraction of different apertures
- Laboratory course is designed to understand the principles of measurement and skills in experimental designs.

SYLLABUS

THEORY COMPONENT

Unit – I **(11 Hours)**

Superposition of collinear harmonic oscillations: Simple harmonic motion (SHM); linearity and superposition principle; superposition of two collinear oscillations having (1) equal frequencies and (2) different frequencies (beats).

Superposition of two perpendicular harmonic oscillations: Graphical and analytical methods. Lissajous figures with equal and unequal frequencies and their uses

Superposition of two harmonic Waves: Standing (stationary) waves in a string; normal modes of stretched strings

Unit – II **(8 Hours)**

Interference: Division of amplitude and division of wavefront; Young's double slit experiment: width and shape of fringes; Fresnel's biprism; Lloyd's mirror; 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

Unit – III **(11 Hours)**

Diffraction:

Fraunhofer diffraction: Single slit, double slit, diffraction grating

Fresnel diffraction: Fresnel's assumptions. Fresnel's half-period zones for plane wave. Explanation of rectilinear propagation of light; Fresnel's diffraction pattern of a straight edge, a slit and a wire using half-period zone analysis

References:

Essential Readings:

1) Vibrations and Waves, A. P. French, 1st edition, 2003, CRC press.
2) The Physics of Waves and Oscillations, N. K. Bajaj, 1998, Tata McGraw Hill.
3) Waves: Berkeley Physics Course, vol. 3, Francis Crawford, 2007, Tata McGraw-Hill.
4) Fundamental of Optics, A. Kumar, H. R. Gulati and D. R. Khanna, 2011, R. Chand Publications.
5) Optics, A. Ghatak, 6th edition, 2017, McGraw-Hill Education, New Delhi
6) The Physics of Vibrations and Waves, H. J. Pain, 2013, John Wiley and Sons.

Additional Readings:

1) Principles of Optics, M. Born and E. Wolf, 7th edition, 1999, Pergamon Press.
2) Optics, E. Hecht, 4th edition, 2014, Pearson Education.
3) Fundamentals of Optics, F. A. Jenkins and H. E. White, 1981, McGraw-Hill

PRACTICAL COMPONENT

(15 Weeks with 4 hours of laboratory session per week)

At least 7 experiments to be performed from the following list

1) To determine the frequency of an electric tuning fork by Melde's experiment and verify λ^2–T law.
2) To study Lissajous figures.
3) Familiarization with Schuster`s focusing and determination of angle of prism.
4) To determine refractive index of the material of a prism using sodium light.
5) To determine the dispersive power and Cauchy's constants of the material of a prism using mercury light.
6) To determine wavelength of sodium light using Fresnel biprism.
7) To determine wavelength of sodium light using Newton's rings.
8) To determine the thickness of a thin paper by measuring the width of the interference fringes produced by a wedge-shaped Film.
9) To determine wavelength of (1) Na source and (2) spectral lines of Hg source using plane diffraction grating.

10) To determine dispersive power and resolving power of a plane diffraction grating.

References for laboratory work:

1) Advanced Practical Physics for students, B. L. Flint and H. T. Worsnop, 1971, Asia Publishing House
2) A Text Book of Practical Physics, I. Prakash and Ramakrishna, 11th edition, 2011, Kitab Mahal
3) Advanced level Physics Practicals, M. Nelson and J. M. Ogborn, 4th edition, reprinted 1985, Heinemann Educational Publishers
4) A Laboratory Manual of Physics for undergraduate classes, D. P. Khandelwal, 1985, Vani Pub.
5) B.Sc. Practical Physics, G. Sanon, 2019, R.Chand & Co

DISCIPLINE SPECIFIC ELECTIVE COURSE
ELEMENTS OF MODERN PHYSICS

Course Title & Code	Credits	Credit distribution of the course			Pre-requisite of the course
		Lecture	Tutorial	Practical	
Elements of Modern Physics	4	2	0	2	--

LEARNING OBJECTIVES

This course introduces modern development in Physics. Starting from Planck's law, it develops the idea of probability interpretation and then discusses the formulation of Schrodinger equation. This paper aims to provide knowledge about atomic physics, hydrogen atoms and X-rays. It also introduces concepts of nuclear physics and accelerators.

LEARNING OUTCOMES

After getting exposure to this course, the following topics would be learnt.

- Main aspects of the inadequacies of classical mechanics as well as understanding of the historical development of quantum mechanics. Heisenberg's Uncertainty principle and its applications, photoelectric effect and Compton scattering
- The Schrodinger equation in 1-d, wave function, probability and probability current densities, Normalization, conditions for physical acceptability of wave functions, position and momentum operators and their expectation values. Commutator of position and momentum operators.
- Time Independent Schrodinger Equation, derivation by separation of variables, wave packets, particle in a box problem, energy levels.
- Modification in Bohr's Quantum Model: Sommerfeld theory of elliptical orbits
- Hydrogen atom energy levels and spectra emission and absorption spectra.
- X-rays: their production and spectra: continuous and characteristic X-rays, Moseley Law.
- Basic Properties of Nuclei, nuclear binding energy, semi-empirical mass formula, nuclear force and meson theory.
- Types of Accelerators, Van-de Graaff generator Linear accelerator, Cyclotron, Synchrotrons

SYLLABUS

THEORY COMPONENT

Unit – I - Origin of Quantum Theory **(8 Hours)**

Black Body Radiation and failure of classical theory, Planck's Quantum Hypothesis, Planck's Radiation Law, Quantitative treatment of Photo-electric effect and Compton scattering, Wave properties of particles: de Broglie hypothesis, Group and Phase velocities and relation between them. Heisenberg's Uncertainty Principle, Gamma ray microscope thought experiment, Position -Momentum Uncertainty, consequences of uncertainty principle.

Unit – II - The Schrodinger Equation **(7 Hours)**

The Schrodinger equation in 1-d, statistical interpretation of wave function, probability and probability current densities. Normalization, conditions for physical acceptability of wave functions with examples, position and momentum operators and their expectation values. Commutator of position and momentum operators

Unit – III - Time Independent Schrodinger Equation (5 Hours)

Demonstration of separation of variable method for time independent Schrodinger equation: Free particle wave function, wave packets, application to energy eigen values and stationary states for particle in a box problem, energy levels.

Unit – IV - Atomic Physics (5 Hours)

Beyond the Bohr's Quantum Model: Sommerfeld theory of elliptical orbits
Hydrogen atom energy levels and spectra emission and absorption spectra
Correspondence principle, X-rays: Method of production, X-ray spectra: Continuous and characteristic X-rays, Moseley Law.

Unit – V - Basic Properties of Nuclei (5 Hours)

Introduction (basic idea about nuclear size, mass, angular momentum, spin), semi-empirical mass formula, nuclear force and meson theory
Accelerators: Accelerator facility available in India: Van-de Graaff generator Linear accelerator, Cyclotron, (Principle, construction, working, advantages and disadvantages). Discovery of new elements of the periodic table

References:

Essential Readings:

1) Concepts of Modern Physics, A. Beiser, 2002, McGraw-Hill.
2) Modern Physics, R. A. Serway, C. J. Moses and C. A. Moyer, 2012, Thomson Brooks Cole Cengage
3) Schaum's Outline of Modern Physics, R. Gautreau and W. Savin, 2020, McGraw Hill LLC
4) Modern Physics for Scientists and Engineers, S. T. Thornton Rex, 4th edition, 2013, Cengage Learning
5) Introduction to Modern Physics, R. Meyer, Kennard, Coop, 2002, Tata McGraw Hill
6) Physics for scientists and Engineers with Modern Physics, Jewett and Serway, 2010.
7) Learning Modern Physics, G. Kaur and G.R. Pickrell, 2014, McGraw Hill.
8) Modern Physics, R. Murugeshan, S Chand & Co. Ltd
9) Schaum's Outline of Beginning Physics II | Waves, electromagnetism, Optics and Modern Physics, A. Halpern, E. Erlbach, McGraw Hill.
10) Theory and Problems of Modern Physics, Schaum's outline, R. Gautreau and W.Savin, 2nd edition, Tata McGraw-Hill Publishing Co. Ltd.
11) Quantum Physics, Berkeley Physics, Vol.4. E. H. Wichman, 1971, Tata McGraw-Hill Co.
12) Quantum Mechanics: Theory and Applications, A. Ghatak and S. Lokanathan, 2004, Macmillan Publishers India Limited.
13) Introduction to Quantum Mechanics, D. J. Griffith, 2005, Pearson Education.
14) Concepts of nuclear physics, B. Cohen, McGraw-Hill Education
15) Atomic Physics, Ghoshal, 2007, S. Chand Publishing House.
16) Atomic Physics, J. B. Rajam, 1980, Chand Publisher
17) Nuclear Physics, S. N. Ghoshal, S. Chand Publishers
18) Atomic and Molecular Physics, R. Kumar, RBSA PUBLISHERS.

Additional Readings:

1) Six Ideas that Shaped Physics: Particles Behave like Waves, T. A. Moore, 2003, McGraw Hill.
2) Thirty years that shook physics: The story of quantum theory, G. Gamow, Garden City, NY: Doubleday, 1966.

PRACTICAL COMPONENT

(15 Weeks with 4 hours of laboratory session per week)

Mandatory activity:

- Sessions on the review of experimental data analysis, sources of error and their estimation in detail, writing of scientific laboratory reports including proper reporting of errors.
- Application to the specific experiments done in the lab
- Familiarization with Schuster`s focusing; determination of angle of prism.

At least six experiments to be performed from the following list

1) Measurement of Planck's constant using black body radiation and photo-detector.
2) Photo-electric effect: photo current versus intensity and wavelength of light, maximum energy of photo-electrons versus frequency of light.
3) To determine the work function of material of filament of directly heated vacuum diode.
4) To determine the Planck's constant using LEDs of at least 4 different colours.
5) To determine the wavelength of the H-alpha emission line of Hydrogen atoms.
6) To determine the ionization potential of mercury.
7) To determine the value of e/m by (a) Magnetic focusing or (b) Bar magnet.
8) To show the tunneling effect in tunnel diodes using I-V characteristics.
9) To determine the wavelength of a laser source using diffraction of a single slit.
10) To determine the wavelength of a laser source using diffraction of double slits.
11) To determine angular spread of He-Ne laser using plane diffraction grating
12) One innovative experiment designed by the teacher relevant to the syllabus.

References for laboratory work:

1) Advanced Practical Physics for students, B. L. Flint and H. T. Worsnop, 1971, Asia Publishing House.
2) A Text Book of Practical Physics, I. Prakash and Ramakrishna, 11th edition, 2011, Kitab Mahal.
3) Advanced level Physics Practicals, M. Nelson and J. M. Ogborn, 4th edition, reprinted, 1985, Heinemann Educational Publishers.
4) A Laboratory Manual of Physics For Undergraduate Classes, D. P. Khandelwal, 1985,Vani Publisher.
5) B. Sc. Practical Physics, H. Singh, S Chand & Co Ltd
6) B.Sc. Practical Physics, G. Sanon, R. Chand and Co.

DISCIPLINE SPECIFIC ELECTIVE COURSE
QUANTUM MECHANICS

Course Title & Code	Credits	Credit distribution of the course			Pre-requisite of the course
		Lecture	Tutorial	Practical	
Quantum Mechanics	4	2	0	2	Elements of Modern Physics paper of this course or its equivalent

LEARNING OBJECTIVES

The development of quantum mechanics has revolutionized the human life. In this course, the students will be exposed to the probabilistic concepts of basic non-relativistic quantum mechanics and its applications to understand the sub atomic world.

LEARNING OUTCOMES

After completing this course, the students will be able to

- Learn the methods to solve time-dependent and time-independent Schrödinger equation.
- Characteristics of an acceptable wave function for any sub atomic particle in various potentials.
- Applications of the Schrodinger equation to different cases of potentials namely infinite and finite potential well, step potential, rectangular potential barrier, harmonic oscillator potential.
- Learn effect of magnetic field on atom, calculation of magnetic moment, basic theory of Stern Gerlach experiment, splitting of lines and energy levels, and various coupling schemes
- In the laboratory course, the students will be able to use computational methods to
    - Solve Schrödinger equation for ground state energy and wave functions of various simple quantum mechanical one- dimensional potentials
    - Solve Schrödinger equation for ground state energy and radial wave functions of some central potentials.

SYLLABUS

THEORY COMPONENT

Unit – I **(10 Hours)**

General discussion of bound states in an arbitrary potential: Review of Schrodinger wave equation, Continuity of wave function, boundary conditions and emergence of discrete energy levels. Application to energy eigen states for a particle in a finite square potential well, reflection and transmission across step potential and rectangular potential barrier.

Unit – II **(10 Hours)**

Harmonic oscillator: Energy eigen values and eigen states of a 1-D harmonic oscillator using

algebraic method (ladder operators) and using Hermite polynomials. Zero point energy and uncertainty principle. Applications to various kinds of wavefunctions

Unit – III **(10 Hours)**

Atoms in Electric and Magnetic Fields: Electron angular momentum, Angular momentum quantization. Electron Spin and Spin Angular Momentum. Larmor's Theorem. Spin Magnetic Moment. Stern-Gerlach Experiment. Normal Zeeman Effect: Electron Magnetic Moment and Magnetic Energy. Pauli Exclusion Principle. Symmetric and Antisymmetric Wave Functions. Spin orbit coupling. Spectral Notations for Atomic States, Total angular momentum, Spin-orbit coupling in atoms-L-S and J-J couplings.

References:

Essential Readings:

1) Quantum Mechanics: Theory and Applications, A. Ghatak and S. Lokanathan, 6th edition, 2019, Laxmi Publications, New Delhi.
2) Introduction to Quantum Mechanics, D. J. Griffith, 2nd edition, 2005, Pearson Education.
3) A Text book of Quantum Mechanics, P. M. Mathews and K. Venkatesan, 2nd edition, 2010, McGraw Hill.
4) Quantum Mechanics, B. H. Bransden and C. J. Joachain, 2nd edition, 2000, Prentice Hall
5) Quantum Mechanics: Concepts and Applications, 2nd edition, N. Zettili, A John Wiley and Sons, Ltd., Publication
6) Atomic Physics, S. N. Ghoshal, 2010, S. Chand and Company

Additional Readings:

1) Quantum Mechanics for Scientists & Engineers, D. A. B. Miller, 2008, Cambridge University Press.
2) Introduction to Quantum Mechanics, R. H. Dicke and J. P. Wittke, 1966, Addison-Wesley Publications
3) Quantum Mechanics, L. I. Schiff, 3rd edition, 2010, Tata McGraw Hill.
4) Quantum Mechanics, R. Eisberg and R. Resnick, 2nd edition, 2002, Wiley.
5) Quantum Mechanics, B. C. Reed, 2008, Jones and Bartlett Learning.
6) Quantum Mechanics, W. Greiner, 4th edition, 2001, Springer.
7) Introductory Quantum Mechanics, R. L. Liboff, 4th edition, 2003, Addison Wesley

PRACTICAL COMPONENT

(15 Weeks with 4 hours of laboratory session per week)

At least 6 programs must be attempted. The implementation may be done in Python/C++/Scilab. Use of available library functions may be encouraged. Similar programs may be added.

Unit 1

1) Visualize the spherical harmonics by plotting the probability density for various values of the quantum numbers (*l, m*).
2) Use the analytical solution for a particle in finite potential well. Numerically solve the transcendental equation one gets after putting the continuity and boundary conditions to determine the energy eigenvalues for various values of the potential width and depth. Plot the corresponding normalised eigenfunctions.

Unit 2

Solve the Schrödinger equation using shooting/finite difference or any other method for the following simple 1-D potentials and compare with the analytical solutions:

1) Particle in a box
2) Particle in a finite potential well
3) Harmonic Potential

Unit 3

Solve the s-wave Schrodinger equation

$$\frac{d^2u}{dr^2} = A(r)u(r), A(r) = \frac{2m}{\hbar^2}[V(r) - E],$$

for the following cases:

1) Ground state and the first excited state of the hydrogen atom:

$$V(r) = \frac{-e^2}{r}$$

where m is the reduced mass of the electron. Obtain the energy eigenvalues and plot the corresponding wavefunctions. Remember that the ground state energy of the hydrogen atom is ≈ -13.6 eV. Take e = 3.795 $(eVÅ)^{1/2}$, ħc = 1973 (eVÅ) and m = 0.511x10^6 eV/c^2.

2) For an atom in the screened coulomb potential

$$V(r) = \frac{-e^2}{r}e^{-r/a}$$

where m is the reduced mass of the system (which can be chosen to be the mass of an electron). Find the energy (in eV) of the ground state of the atom to an accuracy of three significant digits. Also, plot the corresponding wavefunction. Take e = 3.795 $(eVÅ)^{1/2}$, m = 0.511x10^6 eV/c^2, and a = 3 Å, 5 Å, 7 Å. In these units ħc = 1973 (eVÅ). The ground state energy is expected to be above -12 eV in all three cases.

Unit 4

Solve the s-wave Schrodinger equation $\frac{d^2u}{dr^2} = A(r)u(r), A(r) = \frac{2m}{\hbar^2}[V(r) - E]$, for a particle of mass m for the following cases

1) Anharmonic oscillator potential

$$V(r) = \frac{1}{2}kr^2 + \frac{1}{3}br^3$$

for the ground state energy (in MeV) of particle to an accuracy of three significant digits. Also, plot the corresponding wave function. Choose m = 940 MeV/c^2, k = 100 MeV fm^{-2}, b= 0, 10, 30 MeV fm^{-3}. In these units, $c\hbar$ = 197.3 MeV fm. The ground state energy is expected to lie between 90 and 110 MeV for all three cases.

2) For the vibrations of hydrogen molecule with Morse potential

$$V(r) = D(e^{-2ar'} - e^{-ar'}), r' = \frac{r - r_0}{r}$$

Here m is the reduced mass of the two-atom system for the Morse potential
Find the lowest vibrational energy (in MeV) of the molecule to an accuracy of three significant digits. Also plot the corresponding wave function.
Take: m = 940 x10^6 eV/c^2, D = 0.755501 eV, α = 1.44, r_0 = 0.131349 Å

Solve the hydrogen atom Schrodinger equation for an external electric field of E=10^9 eV/cm. The additional term in the Hamiltonian will be eEz .

Laboratory based experiments (Optional):

1) Study of Electron spin resonance- determine magnetic field as a function of the resonance frequency
2) Study of Zeeman effect: with external magnetic field; Hyperfine splitting
3) Quantum efficiency of CCD

References for laboratory work:

1) Schaum's Outline of Programming with C++, J. Hubbard, 2000, McGraw-Hill Education.
2) C++ How to Program, P. J. Deitel and H. Deitel, 2016, Pearson
3) Scilab (A Free Software to Matlab): H. Ramchandran, A. S. Nair, 2011, S. Chand and Co
4) Documentation at the Python home page (https://docs.python.org/3/) and the tutorials there (https://docs.python.org/3/tutorial/).
5) Documentation of NumPy and Matplotlib: https://numpy.org/doc/stable/user/ and https://matplotlib.org/stable/tutorials/
6) Computational Physics, Darren Walker, 1st edition, 2015, Scientific International Pvt. Ltd
7) An Introduction to Computational Physics, T. Pang, 2010, Cambridge University Press

DISCIPLINE SPECIFIC ELECTIVE COURSE
MATHEMATICAL PHYSICS-I

Course Title & Code	Credits	Credit distribution of the course			Pre-requisite of the course
		Lecture	Tutorial	Practical	
Mathematical Physics-I	4	3	1	0	--

LEARNING OBJECTIVES

The emphasis of course is to equip students with the mathematical tools required in solving problem of interest to physicists. The mathematical tools learned by students will help them develop critical skills and knowledge that will prepare them not only for doing fundamental and applied research but also for a wide variety of careers.

LEARNING OUTCOMES

After completing this course, students will be able to,

- Apply the concepts of calculus to the functions of more than one variable.
- Understand the concepts of vector calculus and apply them to the physics problems.
- Represent a periodic function by a sum of harmonics using Fourier series.
- Obtain power series solution of differential equation of 2^{nd} order with variable coefficients using Frobenius method.
- Understand special functions.

SYLLABUS

THEORY COMPONENT

Unit – I **(18 Hours)**

Calculus of functions of more than one variable: Functions of several variables, Limits and continuity, partial derivatives, chain rule for partial derivatives, exact and inexact differentials. Taylor's series of a function of two variables. Maxima and minima, constrained extrema using Lagrange Multipliers.

Vector Calculus: Scalar and vector fields, directional derivative gradient of a scalar field and its geometrical interpretation. Divergence and curl of a vector field and their physical interpretation. Laplacian operator. Vector identities.

Integrals of vector-valued functions of single scalar variable. Multiple integrals, Jacobian, Notion of infinitesimal line, surface and volume elements. Line, surface and volume integrals of vector fields. Flux of a vector field. Gauss divergence theorem, Green's and Stokes' Theorems (no proofs) and their applications.

Unit – II **(12 Hours)**

Fourier series: Periodic functions. Orthogonality of sine and cosine functions, Dirichlet Conditions (Statement only). Expansion of periodic functions in a series of sine and cosine

functions and determination of Fourier coefficients. Even and odd functions and their Fourier expansions. Parseval's Identity. Application: Summing of Infinite Series.

Unit – III **(15 Hours)**

Frobenius method and special functions: Singular Points of Second Order Linear Differential Equations and their importance. Frobenius method and its applications to differential equations. Legendre Differential Equation and its solution. Properties of Legendre Polynomials: Rodrigues Formula, Orthogonality. Recurrence relations.

References:

Essential Readings:

1) Mathematical methods for Scientists and Engineers, D.A. McQuarrie, 2003, Viva Book.
2) Advanced Engineering Mathematics, E. Kreyszig, 2008, Wiley India.
3) Fourier analysis: With Applications to Boundary Value Problems, M. Spiegel, 2017, McGraw Hill Education
4) Essential mathematical methods, K. F. Riley and M. P. Hobson, 2011, Cambridge Univ. Press.
5) Vector Analysis, M. Spiegel, 2nd edition, 2017, Schaum's outlines series.

Additional Readings:

1) Mathematical Methods for Physicists, G. B. Arfken, H. J. Weber and F. E. Harris, 7th edition, 2013, Elsevier.
2) Introduction to Electrodynamics, Chapter 1, D. J. Griffiths, 4th edition, 2017, Cambridge University Press.
3) Advanced Engineering Mathematics, D. G. Zill and W. S. Wright, 5th edition, 2012, Jones and Bartlett Learning.
4) Introduction to Vector Analysis, Davis and Snider, 6th edition, 1990, McGraw Hill.
5) Differential Equations, G. F. Simmons, 2007, McGraw Hill.
6) Mathematical Physics, A. K. Ghatak, I. C. Goyal and S. J. Chua, 2017, Laxmi Publications Private Limited

DISCIPLINE SPECIFIC ELECTIVE COURSE
MATHEMATICAL PHYSICS-II

Course Title & Code	Credits	Credit distribution of the course			Pre-requisite of the course
		Lecture	Tutorial	Practical	
Mathematical Physics-II	4	3	1	0	Mathematics as Discipline Specific Core paper containing Linear Algebra and Calculus.

LEARNING OBJECTIVES

The emphasis of course is to equip students with the mathematical tools required in solving problem of interest to chemists. The mathematical tools might be building blocks to understand the fundamental computational skills and hence enable them to solve a wide range of physics as well as chemistry problems. Overall, to help students develop critical skills and knowledge that will prepare them not only for doing fundamental and applied research but also prepare them for a wide variety of careers.

LEARNING OUTCOMES

After completing this course, students will be able to,

- Determine continuity, differentiability and analyticity of a complex function, find the derivative of a function and understand the properties of elementary complex functions.
- Evaluate a contour integral, fundamental theorem of calculus and Cauchy's integral formula.
- Find the residues and use the residue theorem to evaluate a contour integral and real integral.
- Learn Fourier Transforms (FTs) and their applications.

SYLLABUS

THEORY COMPONENT

Unit – I **(25 Hours)**

Complex Analysis:

Complex functions and mappings. Limits of complex functions. Continuity and differentiability of a complex function, Cauchy-Riemann equations, sufficient conditions for differentiability. Analytic functions, singular points. Elementary functions.

Integration in complex plane: contours and contour integrals, Cauchy-Goursat Theorem (No proof) for simply and multiply connected domains. Cauchy's Inequality. Cauchy's Integral formula. Taylor's and Laurent's theorems (statements only), types of singularities (removable, poles and essential), residues and Cauchy's residue theorem. Evaluation of real integrals by contour integration (excluding integrands with branch points).

Unit – II **(15 Hours)**

Fourier Transforms (FTs): Fourier Integral Theorem. Sine and Cosine Transforms. Properties of FTs: (1) FTs of Derivatives of Functions, (2) Change of Scale Theorem, (3) FTs of Complex Conjugates of Functions, (4) Shifting Theorem, (5) Modulation Theorem, (6) Convolution Theorems, and (7) Parseval's Identity.

Solution of First and Second Order ODEs by using FTs.

Unit – III **(5 Hours)**

Some Special Integrals: Beta and Gamma Functions and Relation between them. Expression of Integrals in terms of Gamma Functions.

References:

Essential Readings:

1) Mathematical Methods in the Physical Sciences, M. L. Boas, 3rd edition, 2007, Wiley India
2) Advanced Engineering Mathematics, E. Kreyszig, 2008, Wiley India
3) Theory and Problems of Linear Algebra, S. Lipschutz, 1987, McGraw-Hill Inc.
4) Mathematical Methods for Physicists, H. J. Weber and G. B. Arfken, 2010, Elsevier.
5) Introduction to Matrices and Linear Transformations, D. T. Finkbeiner, 1978, Dover Publication.
6) Matrices and tensors in Physics: A.W. Joshi, 2017, New Age International Pvt.

Additional Readings:

1) Mathematical Tools for Physics, J. Nearing, 2010, Dover Publications.
2) Elementary Linear Algebra, Applications Version, H. Anton and C. Rorres, Wiley Student edition.
3) Mathematics for Physicists, S. M. Lea, 2004, Thomson Brooks/Cole.
4) An Introduction to Linear Algebra and Tensors, M. A. Akivis, V. V. Goldberg, Richard and Silverman, 2012, Dover Publications

DISCIPLINE SPECIFIC ELECTIVE COURSE
ELECTRICITY AND MAGNETISM

Course Title & Code	Credits	Credit distribution of the course			Pre-requisite of the course
		Lecture	Tutorial	Practical	
Electricity and Magnetism	4	2	0	2	Physics and Mathematics syllabus of class XII

LEARNING OBJECTIVES

This course reviews the concepts of electricity and magnetism learnt at school from a more advanced perspective and goes on to build new concepts. The course covers static and dynamic electric and magnetic fields, and the principles of electromagnetic induction. It also includes analysis of electrical circuits and introduction of network theorems. The students will be able to apply the concepts learnt to several real world problems.

LEARNING OUTCOMES

At the end of this course, students will be able to,

- Understand Gauss' law, Coulomb's law for the electric field, and apply them to systems of point charges as well as line, surface, and volume distributions of charges. Also to use the knowledge to solve some simple problems
- Express electric current and capacitance in terms of electric field and electric potential.
- Calculate the force experienced by a moving charge in a magnetic field
- To determine the magnetic force generated by a current carrying conductor
- Have brief idea of magnetic materials, understand the concept of electromagnetic induction, solve problems using Faraday's and Lenz's laws
- In the laboratory course, students will be able to measure resistance (high and low), voltage, current, self and mutual inductance, capacitor, strength of magnetic field and its variation, study different electric circuits.

SYLLABUS

THEORY COMPONENT

Unit – I - Electrostatics **(10 Hours)**

Electric field, electric flux, Gauss' theorem in electrostatics, applications of Gauss' theorem (linear, plane and spherical charge distribution), divergence and curl of electric field, electric field as negative gradient of the potential, line integral of electric field, electric field of a dipole and charged disc, capacitance due to parallel plates and spherical condenser. Electrostatic energy of system of charge (charged sphere), dielectric medium, dielectric polarization, displacement vector, Gauss' theorem in dielectrics, parallel plate capacitor filled with dielectric.

Unit – II - Magnetostatics **(8 Hours)**

Magnetic force between current elements and definition of magnetic field B, Biot-Savart's law and its applications (current carrying straight conductor, current carrying circular coil,

current carrying solenoid), divergence and curl of magnetic field, Ampere's circuital law, magnetic properties of materials (magnetic intensity, magnetic induction, permeability, magnetic susceptibility), brief introduction of dia-, para- and ferro magnetic materials

Unit – III - Electromagnetic Induction (7 Hours)

Faraday's laws of electromagnetic induction, Lenz's law, self-inductance of single coil,mutual inductance of two coils, energy stored in magnetic field. Maxwell`s equations and equation of continuity of current, displacement current

Unit – IV - Electrical Circuits (5 Hours)

DC Circuits: Review of Kirchhoff's Voltage and Current Laws, Thevenin theorem, Norton theorem, Superposition theorem, Maximum Power Transfer theorem.

References:

Essential Readings:

1) Fundamentals of Electricity and Magnetism, A. F. Kip, 2nd edition, 1981, McGraw-Hill.
2) Electricity and Magnetism, J. H. Fewkes and J. Yarwood, Vol. I, 1991, Oxford Univ. Press
3) Electricity and Magnetism, D. C. Tayal, 1988, Himalaya Publishing House.
4) Fundamentals of Electromagnetics, M. A. W. Miah, 1982, Tata McGraw Hill
5) Introduction to Electrodynamics, D.J. Griffiths, 3rd edition, 1998, Benjamin Cummings.

Additional Readings:

1) Electricity and Magnetism, Berkeley Physics Course, E. M. Purcell, 1986, McGraw-Hill Education.
2) University Physics, R. L. Reese, 2003, Thomson Brooks/Cole.
3) Problems and Solutions in Electromagnetics, A. Ghatak, K. Thyagarajan and R. Varshney.
4) Schaum's Outline of Electric Circuits, J. Edminister and M. Nahvi, 3rd edition, 1995, McGraw Hill.

PRACTICAL COMPONENT

Mandatory training:

- Measuring resistances, a.c and d.c voltages, d.c. current, capacitance using multimeter.
- Working of various instruments and circuits related to different experiments.
- Knowledge of recording and analyzing experimental data.

At least six experiments to be performed from the following list

1) Ballistic Galvanometer:
    a. Measurement of charge and current sensitivity
    b. Measurement of critical damping resistance
    c. Determine a high resistance by leakage method
    d. Determine self-inductance of a coil by Rayleigh's method.
2) To compare capacitances using de Sauty's bridge.
3) Measurement of field strength B and its variation in a solenoid
4) To study the characteristics of a series RC Circuit.

5) To study a series LCR circuit and determine its resonant frequency and quality factor.
6) To study a parallel LCR circuit and determine its anti-resonant frequency and quality factor
7) To determine a low resistance by Carey Foster bridge.
8) To verify the Thevenin, superposition and maximum power transfer theorems
9) To verify Norton theorem

References for laboratory work:

1) Advanced Practical Physics for Students, B. L. Flint and H. T. Worsnop, 1971, Asia Publishing House.
2) Engineering Practical Physics, S. Panigrahi and B. Mallick, 2015, Cengage Learning India Pvt. Ltd.
3) A Textbook of Practical Physics, I. Prakash and Ramakrishna, 11th edition, 2011, Kitab Mahal, New Delhi.
4) Practical Physics, G. L. Squires, 4th edition, 2015, Cambridge University Press
5) Advanced level Physics Practicals, M. Nelson and J. M. Ogborn, 4th edition, reprinted 1985, Heinemann Educational Publishers

ANNEXURE-56

Sub: Amendment to Ordinance V

[EC Resolution No. 39-1-1 dated 15.12.2023]

Following addition be made to Appendix-II-A to the Ordinance V (2-A) of the Ordinances of the University;

Add the following:

Curriculum structure for the Integrated Teacher Education Programmes (ITEP) and the syllabi for courses to be offered in Semester 1 and Semester 2:

1. ITEP Middle Curriculum Structure and course syllabi – Semester 1 and Semester 2 ***(As per Annexure-1)***

2. ITEP Secondary Curriculum Structure and Course syllabi – Semester 1 and Semester 2 ***(As per Annexure-2)***

Integrated Teacher Education Programme ITEP

Curriculum Structure and Course Syllabi
Semester 1 & 2

Middle

2023

Faculty of Education
University of Delhi, Delhi 110007

Head/Dean
विभागाध्यक्ष एवं संकाय अध्यक्ष
शिक्षा विभाग/Deptt. of Education
दिल्ली विश्वविद्यालय, दिल्ली-110007
University of Delhi, Delhi-110007

CURRICULAR STRUCTURE OF INTEGRATED TEACHER EDUCTAION PROGRAMME Middle (OPTION 1)

Table 1. ITEP Structure

S. No	Curricular Component	Courses	Credits per semester								Total Credits per course	Total Credits
			S-1	S-2	S-3	S-4	S-5	S-6	S-7	S-8		
1.	1. Student Induction programme	Two-week student induction Programme		--	--	--	--	--	--	--	--	
2.1	2. Foundation of the Education	Evolution of Indian Education	4	--	--	--	--	--	--	--	4	34
2.2		Sociological Perspectives of Education	--	4	--	--	--	--	--	--	4	
2.3		Child Development & Education Psychology	--	--	4	--	--	--	--	--	4	
2.4		Philosophical Perspectives of Education	--	--	--	4	--	--	--	--	4	
2.5		Inclusive Education	--	--	--	--	2	--	--	--	2	
2.6		Curriculum Planning & Development (textbooks, Material, development, etc.) – (stage-specific)	--	--	--	--	2	--	--	--	2	
2.7		Assessment and Evaluation	--	--	--	--	--	2	--	--	2	
2.8		Perspectives on School Leadership & Management	--	--	--	--	--	--	2	--	2	
2.9		Research in Education- I	--	--	--	--	--	2	--	--	2	
2.10		Research in Education- II	--	--	--	--	--	--	2	--	2	
2.11		Education Policy Analysis	--	--	--	--	--	--	--	2	2	
2.12		One Elective from offered courses as per the choice of student teacher (e.g., Adolescence education, Education for Mental Health, Education for sustainable development, Emerging Technologies in Education, Gender Education, Guidance and Counselling, Human Rights Education, Peace Education, Sports and fitness education, Tribal Education, Economics of Education or any other relevant course decided by university / Institution)	--	--	--	--	--	--	--	4	4	
3.1	3. Disciplinary/Inter-disciplinary courses	One/two discipline(s) from any of the school curricular areas i) Languages ii) Physical Sciences (Physics., Chemistry, etc.) iii)Biological Sciences (Zoology, Botany, etc.) iv)Mathematics v)Social Sciences &Humanities (Economics, History, Geography, Psychology, Political Science, etc.) vi) Business Studies vii) Arts (Visual and Performing) viii) Physical Education and Yoga ix) Vocational Education x) Computer Science Xi) Agriculture . xii) Home Science xiii) Any other school subjects	8	12	12	12	12	8	--	--	64	64 Discipline A-48 & Discipline B-16 *(Discipline A & B may be from the same curricular Area.)*

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4.	4. Stage-Specific Content-cum- Pedagogy Courses		stage specific Content-cum- pedagogy courses	--	--	4	4	4	4			16	16
5.1	5.	Language Proficiency	Language -I (as per the 8th schedule of the constitution of India)	4		--	--	--	--	--	--	4	28
5.2			Language -II (other than language -I)	--	4	--	--	--	--	--	--	4	
5.3.		Ability Enhancement & Value-Added Courses	Art Education (Performing and Visual)	2					2			4	
5.4.I			Understanding India Part I (Indian Ethos and Knowledge System)	2								4	
5.4.II			Understanding India Part II (Indian Ethos and Knowledge System)		2								
5.5			Teacher and Society	2								2	
5.6			ICT in Education				2					2	
5.7			Mathematics and Quantitative Reasoning						2			2	
5.8			Sports, Nutrition and Fitness			2						2	
5.9			Yoga and Understanding Self								2	2	
5.10			Citizenship Education, Sustainability and Environment Education								2	2	
6.1	6. School Experience		Pre-Internship Practice (Demonstration lessons, Peer teaching)					2				2	20
6.2			School Observation						2			2	
6.3			School-Based Research Project								2	2	
6.4			Internship in Teaching							10		10	
6.5			Post- Internship (Review and Analysis)								2	2	
6.6			Creating Teaching Learning Material/ Work Experience (Educational Toy Making, local/Traditional Vocations etc.)							2		2	
7.1	7. Community Engagement and Service		Community Engagement and Service (participation in NSS- related activities, New India Literacy Programme etc.)								2	2	2
8.1	8. Research Project/ Dissertation		Research Project/ Dissertation -I							6		6	12
8.2			Research Project/ Dissertation -II								6	6	
			Total	22	22	22	22	22	22	22	22	176	

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CURRICULAR STRUCTURE OF INTEGRATED TEACHER EDUCATION PROGRAMME Middle OPTION 2

Table 1: ITEP Structure

S. No	Curricular Component	Courses	Credits per semester								Total Credits per course	Total Credits
			S-1	S-2	S-3	S-4	S-5	S-6	S-7	S-8		
1.	1. Student Induction programme	Two-week student induction Programme		--	--	--	--	--	--	--	--	
2.1	2. Foundation of the Education	Evolution of Indian Education	4	--	--	--	--	--	--		4	34
2.2		Sociological Perspectives of Education		4							4	
2.3		Child Development & Education Psychology			4						4	
2.4		Philosophical Perspectives of Education				4					4	
2.5		Inclusive Education					2				2	
2.6		Curriculum Planning & Development (textbooks, Material, development, etc.) – (stage-specific)					2				2	
2.7		Assessment and Evaluation						2			2	
2.8		Perspectives on School Leadership & Management							2		2	
2.9		Research in Education- I						2			2	
2.10		Research in Education- II							2		2	
2.11		Education Policy Analysis								2	2	
2.12		One Elective from offered courses as per the choice of student teacher (e.g., Adolescence education, Education for Mental Health, Education for sustainable development, Emerging Technologies in Education, Gender Education, Guidance and Counselling, Human Rights Education, Peace Education, Sports and fitness education, Tribal Education, Economics of Education or any other relevant course decided by university / Institution)								4	4	
3.1	3. Disciplinary/Inter-disciplinary courses	One/two discipline(s) from any of the school curricular areas i) Languages ii) Physical Sciences (Physics., Chemistry, etc.) iii)Biological Sciences (Zoology, Botany, etc.) iv)Mathematics v)Social Sciences &Humanities (Economics, History, Geography, Psychology, Political Science, etc.) vi) Business Studies vii) Arts (Visual and Performing) viii) Physical Education and Yoga ix) Vocational Education x) Computer Science Xi) Agriculture xii) Home Science xiii) Any other school subjects	8	12	12	12	12	8	4	8		76 Discipline A -48 & Discipline B-28 (Discipline A & B may be from the same curricular Area.)

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4.	4. Stage-Specific Content-cum- Pedagogy Courses		stage-specific Content-cum- pedagogy courses	--	--	4	4	4	4	--	--	16	16
5.1	5.	Language Proficiency	Language -I (as per the 8th schedule of the constitution of India)	4		--	--	--	--	--	--	4	28
5.2			Language -II (other than language -I)	--	4	--	--	--	--	--	--	4	
5.3.		Ability Enhancement & Value-Added Courses	Art Education (Performing and Visual)	2					2			4	
5.4.I			Understanding India Part I (Indian Ethos and Knowledge System)	2								4	
5.4.II			Understanding India Part II (Indian Ethos and Knowledge System)		2								
5.5			Teacher and Society	2								2	
5.6			ICT in Education				2					2	
5.7			Mathematics and Quantitative Reasoning						2			2	
5.8			Sports, Nutrition and Fitness			2						2	
5.9			Yoga and Understanding Self								2	2	
5.10			Citizenship Education, Sustainability and Environment Education							2		2	
6.1	6. School Experience		Pre-Internship Practice (Demonstration lessons, Peer teaching)					2				2	20
6.2			School Observation						2			2	
6.3			School-Based Research Project								2	2	
6.4			Internship in Teaching							10		10	
6.5			Post-Internship (Review and Analysis)								2	2	
6.6			Creating Teaching Learning Material/ Work Experience (Educational Toy Making, local/Traditional Vocations etc.)							2		2	
7.1	7. Community Engagement and Service		Community Engagement and Service (participation in NSS-related activities, New India Literacy Programme etc.)								2	2	2
8.1	8. Research Project/ Dissertation		Research Project/ Dissertation -I							--			–
8.2			Research Project/ Dissertation -II								--		
			Total	22	22	22	22	22	22	22	22	176	

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F.2.1 Evolution of Indian Education

CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course Title & Code	Credits	Credit Distribution of the Course			Eligibility Criteria	Pre-requisite
		Lecture	Tutorial	Practical/Practice		
Evolution of Indian Education **F.2.1**	4	3	1	-	Class XII	Nil

2.1.1 About the Course and Learning Objectives

The course seeks to develop an understanding among student teachers of the evolution of educationin India that would allow student teachers to locate themselves within the larger system of education. The course aims at orienting student teachers to the historical perspective of Indian education including the development and features of education in ancient India such as the Gurukuls, the post-Vedic period, during Mauryan and Gupta empires, during the colonial era and post-independence period, and the future perspectives about the education development in India, and progression from Education 1.0 to Education 4.0, etc. This course also provides an overview of thecontribution of Indian thinkers to evolve the Indian Education system – Savitribai and Jyotiba Phule,Rabindranath Tagore, Swami Vivekananda, Mahatma Gandhi, Sri Aurobindo, Gijubhai Badheka, Pt. Madanmohan Malaviya, Jiddu Krishnamurti, Dr. Bhima Rao Ambedkar and others.

2.1.2 Learning Outcomes

After completion of this course, it is expected that the student teachers will be able to:

1. discuss and understand the genesis, vision and evolution of education in India from ancient to contemporary times.
2. critically revisit colonial education and it impact on the contemporary Indian education system.
3. enable them to shape their educational perspective to act as an effective teacher.
4. locate themselves in the larger system of education in India while discussing the contribution of Indian thinkers
5. develop a road map for futuristic education system in India for addressing the need of local and global context.

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UNIT – I: Ancient Indian Education: Vedic Period (2 Weeks)

A. Vision, Objectives, and Salient Features of the Vedic Education System.
B. Teaching and Learning Process during Vedic Period
C. Forms and Development of Educational Institutions and Organizational Practices.
D. Understanding Guru Shishya Parampara

UNIT-II: Ancient Indian Education: Buddhist and Jain Period (2 Weeks)

A. Buddhist and Jain Education System: Vision, Objective and Salient Features
B. Teaching -Learning and Curricular Practices during the Buddhist, Jain and Sangam Periods
C. Finance and Management of Educational Institutions.
D. Contribution of Educational Institutions: Nalanda, Taxila, Vikramshila, Vallabhi.

UNIT – III: Post-Gupta Period to Colonial Period (2 Weeks)

A. Brief Historical Development and Salient Features of Education in this Era
B. Educational Systems: Nadia, Home-Education, Pathshalas, Tols, Maktab, Chatuspadis and Gurukuls etc.
C. Pedagogical Inquiry, Community and Its Interface.
D. Finance and Management: Critical Analysis of the Role of Dynasties with reference to Educational Institutions.

UNIT IV: Modern Indian Education (9 Weeks)

A. Colonial Education in India:

   Critical Examination of Wood's Dispatch and Macaulay Minutes; Colonization of Education in India.

B. Swadeshi and Nationalist attempts at Educational Reforms and Contribution of Indian Thinkers (with reference to Objectives of Education, Curriculum and Pedagogy):

   Savitribai and Jyotiba Phule, Swami Vivekananda, Pt. Madanmohan Malaviya, Sir Syed Ahmad Khan, Rabindranath Tagore, Mahatma Gandhi, Sri Aurobindo, Gijubhai Badheka, Jiddu Krishnamurti and Dr. Bhim Rao Ambedkar

C. Education in Independent India
   - Constitutional Values and Educational Provisions.
   - Educational Committees, Commissions and Policies with specific reference to the Kothari Commission, National Policy on Education 1968; National Policy on Education 1986 and its Plan of Action 1992.
   - Educational Planning and Organisation
     Critical review and impact of DPEP, SSA UEE, RMSA, RTE Act 2009.
   - NEP 2020: Futuristic Vision for Education in India

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2.1.3 Practicum

Following are the suggestive practicals and activities. The teachers may design more tasks based on classroom interactions and discussions.

- Prepare a report highlighting the significance of educational reforms in School education in the light of NEP 2020.
- Critically analyze the role of education in understanding the concept of citizenship for democracy.
- Compare the vision, objectives, and salient features of education during different periods.
- Design a plan of action to develop awareness/attitude/practices related to Fundamental Rights/Fundamental duties/Democratic Citizenship.
- Sharing of student experiences (in groups) related to establishing Indian constitutional values through School Education and the need for dynamic and vibrant School Ethos.
- Survey of strengths and limitations of educational institutions of one's own locality.
- Visit to places of educational significance.
- Design activities for developing awareness, attitudes, skills, and participatory values to negotiate diversity in the classroom.

2.1.4 Mode of Transaction

The course content transaction will include the following:

- Planned lectures infused with multimedia /PowerPoint presentations.
- Small group discussion, panel interactions, small theme-based seminars, group discussions, cooperative teaching and team teaching, selections from theoretical readings, case studies, analyses of educational statistics and personal field engagement with educationally marginalized communities and groups, through focus group discussions,surveys, short-term project work, etc.
- Hands-on experience of engaging with diverse communities, children, and schools.

2.1.5 Mode of Assessment

The examination scheme and mode shall be as prescribed by the Examination Branch, University of Delhi, from time to time.

2.1.6 Suggestive Reading Materials

Teachers may suggest books/readings as per the needs of the learners and learning content.

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F.2.2 Sociological Perspectives of Education

CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course Title & Code	Credits	Credit Distribution of the Course			Eligibility Criteria	Pre-requisite
		Lecture	Tutorial	Practical/Practice		
Sociological Perspectives of Education **F.2.2**	4	3	1	-	Class XII	Nil

2.2.1 About the Course and Learning Objectives

Sociological Perspectives of Education seek to encourage students to explore the relationship between social structures and educational provision. The course focuses on the study of the social behaviour of individuals, groups, and societies. It provides opportunities for student teachers to examine relationships among individuals, as well as relationships between people and their societies.

2.2.2 Learning Outcomes

After completion of this course, it is expected that the student teachers will be able to:

- recognize the social context of education while outlining the meaning, nature, and scope of educational sociology
- explain the process of socialization and its relation with education.
- analyze the role of education in the process of social change
- analyze the impact of culture on education through a study of dimensions of culture and their importance to educational practices,
- analyze the provisions of the constitution in promoting equity via education.
- identify the relationship between education, modernization and social change

UNIT – I: Education and Society (3 Weeks)

A. Sociological Reflections on the Relationship of Society and Education (role, status, institution, systems and practices)
B. Conceptual Understanding of Ideology, Social System, Social Values, Norms, Conflict and Modernization
C. Educational Sociology and Education as a Social System/Institution
D. Process of Socialization with reference to the role of Various Institutions
E. Social Positionality of Individual and the Role of Education

UNIT – II: Education and Social Change (4 Weeks)

A. Meaning and Dimensions of Social Change.

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B. Factors affecting Education and Social Change: Technology, Market, Social and Educational Movements, Curricular Innovations, Value Conflict, and Legal Provisions.
C. Inequalities (Gender, Race, Colour, Class, Geo-political, Geo-spatial, Caste, Disability etc.) and Asymmetries with interface of Family, School and Community
D. Constitution of India, Education and Social Empowerment (Social Equality and Equity)
E. Modernity, Education and Social Change

UNIT – III: Education, Culture and Socialization (4 Weeks)

A. Schooling in India: Intersection of Education, Culture and Community
B. Education as a Process of Socialization.
C. Role of the following on Culture and Educational Process: Social Welfare, Social Reform Movements, Legal interventions on Child Marriage and Child Labor Act, Educational Policies and Acts, Adult Literacy, New Technologies of Communication and Equality.
D. Researching Culture and Education: A Cross-Cultural Analysis

UNIT – IV: Education and Values (4 Weeks)

A. Concept and Types of Values
B. Understanding the Relationship between Education and Values
C. Constitutional Values and its Impact on Education.
D. Human Rights Perspective/Approaches, Education and Values.
E. Sociology's Response to Environmental Issues through Education
F. Pedagogical Concerns in Promoting Values through Education

2.2.3 Practicum

1. Critical/Reflective study of contemporary aims of education and their social determinants.
2. Observation and critical study on how textbooks determine every activity of teacher and learner in the school.
3. A critique of textbook culture in school.
4. Observing the process of knowledge construction by children in structured and unstructured environments to appreciate their learning processes and nature.
5. A critical analysis of Constitution of India in the context of process of Education in India / Educational Policies / Educational Commissions)
6. Critically observing nearby society/ locality in groups of 4-5 students and sharing observations related to cultural/ social influences on educational practices.
7. Analyzing social purpose of NEP, 2020.

2.2.4 Mode of Transaction

The course content transaction will include the following:

- Planned lectures infused with multimedia /PowerPoint presentations.
- Small group discussion, panel interactions, small theme-based seminars, group discussions, cooperative teaching and team teaching, selections from theoretical readings, case studies, analyses of educational statistics and personal field engagement with educationally marginalized communities and groups, through focus group discussion, surveys, short term project work etc.

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- Hands-on experience of engaging with diverse communities, children and schools.

2.2.5 Mode of Assessment

The examination scheme and mode shall be as prescribed by the Examination Branch, University of Delhi, from time to time.

2.2.6 Suggestive Reading Materials

- Beattie, J. (1999). *Other culture: Aims, methods and achievements in social anthropology*. Routledge.
- Bell, M. Mayerfeld (2004). *An invitation to environmental sociology.* Pine Forge Press.
- Berlak, A., & Berlak, H. (1981). *Dilemmas of schooling: Teaching and social change*. Routledge.
- Blackledge, D. & Hunt, B. (2019). *Sociological interpretations of education*. Routledge. https://doi.org/10.4324/9780367351663
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- Bryk, A. S. & B, Schneider. (2002). *Trust in schools: A core resource for improvement*. Sage Foundation.
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- Pathak, A. (1998) *Indian Modernity*.: Contradictions, paradoxes and possibilities. Gyan Publishing house.
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- Rebecca, B. & Robert, D. (2008). How Schools Work. In Ballantine, J.H., & Spade, J.Z., Eds. (2013). *Schools and society: A sociological approach to education*. (3rd Ed.). 73-79. Sage Publication
- Shah, G. (2009). *Social movement in India*. Sage Publication.
- Tillman, G. D. (1998). *Parenting for the 21st century: A values-based approach*. [Paper presented]. UNESCO Conference, Melbourne, Australia - Education for the 21st Century.
- Weber, M. (1949). *The methodology of the social sciences (1st ed.)*. The free press of Glencoe
- Weber, M. (2011). The rationalization of education and training. In A. Richard., I. R. Beattie & K. Ford, (Eds). *The structure of schooling: Readings in the sociology of education* (3rd ed.). Sage Publication. ISBN 978-1-4522-0542-7.

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AE & VAC: 5.1: Language - I (As per the 8th Schedule of the Constitution of India)

CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course Title & Code	Credits	Credit Distribution of the Course			Eligibility Criteria	Pre-requisite
		Lecture	Tutorial	Practical/Practice		
Language - I (As per the 8th Schedule of the Constitution of India) **AE & VAC: 5.1**	4	-	-	4	Class XII	Nil

5.1.1 About the Course and Learning Objectives

Language has undeniable links with all kinds of learning. Language enables an individual to understand new concepts, exchange ideas and communicate thoughts with fellow beings. To fully appreciate the role of language in education, one must develop a holistic perspective on language. Language needs to be examined in a multi-dimensional space, giving importance to its structural, literary, sociological, cultural, psychological, and aesthetic aspects. The National Education Policy 2020 envisages imparting language skills as part of holistic education. It lays thrust on the need to enhance language skills for better cognitive development and the development of a holistic personality of the learners.

This course aims to enable student-teachers to enhance their ability to effectively listen, speak, read, write, and demonstrate language skills. Language skills are fundamental to constructing knowledge in all academic disciplines, participating effectively in work and creating sense in everyday life. Through this course, the students will be able to enhance proficiency in reading with comprehension, understanding, thinking, and conceptualizing. The course seeks to enhance student-teachers' critical thinking abilities and effective communication skills. The course involves hands-on activities and practical sessions that help student-teachers develop and use language skills in various situations.

5.1.2 Learning Outcomes

After completing the course, it is expected that the student-teachers will be able to:

- define language and its functions in various contexts;

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- discuss the various constitutional perspectives on languages;
- recognize the link between language and cognition and using linguistic knowledge and skills for effective communication of ideas and thoughts;
- demonstrate knowledge and capacity for effective listening, speaking, reading, writing and critical thinking;
- build interpersonal relationships and enhance social skills

UNIT – I: Language, Communication and Cognition (3 Weeks)

A. Language: Definition, Characteristics, Functions; Language as a means of Communication and Language as a Medium of Cognition

B. Language, Culture and Society: Language Variation, Language versus Dialect, Constitutional Perspective of Languages; Language Policy and Language Planning, Language Standardization; Bi-/Multilingualism in India

C. Nature and Process of Communication: Principles, Types of Communication (Formal and Informal, Written and Oral, Verbal and Non-Verbal), Barriers to Communication, Features of Effective Communication, The Context of Communication, The Role of Decoder, Face-to-Face Interaction, Turn-Taking, Conversation, New-Age Technologies

UNIT – II: Understanding Language, Components and Functions (3 Weeks)

A. Classification of Speech Sounds and Letters, Parts of Speech, Production of Speech Sounds in Languages; Suprasegmentals: Stress, Pitch, Tone, Intonation, Juncture, Graph Phonemic Awareness

B. Identification of Morphemes, Word Formation Processes, Lexical, Vocabulary Formation, Coining New Words, Speech Acts

C Syntax-Types of Sentences- Simple, Complex, And Compound

D. Semantics and Pragmatics

UNIT – III: Listening and Speaking Skills (3 Weeks)

A. Listening and Hearing; Subskills of Listening, Good Listening Behaviour; Listening Strategies.

B. Listening Comprehensions: Listening Across the Curriculum, Recorded Speeches/Texts; Understanding of Various Accents, Note Taking

C. Speaking to Learn And Learning To Speak; Impact of Culture on Speaking; Practicing Narrative Skills; Body Language, Voice, and Pronunciation; Creating Interest and Establishing a Relationship with the Audience.

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D. Task/Activities for Developing Speaking Skills- Situational Conversations and Role Plays; Speech, Elocution, Discussion, Debate, Storytelling, Illustrations

UNIT – IV: Reading Skills (3 Weeks)

A. Reading Comprehension, Types of Reading, Meaning and Context, Reading as an Interactive Process; Strategies for Making Students Active Readers and Developing Critical Reading Skills;

B. Understanding Denotative and Connotative Aspects of a Text, Vocabulary Development Through Reading, Reading Discipline-Based Texts, and Features that Make Texts Complex.

C. Enhancing Critical Thinking Abilities; Critical Interpretation. Questioning and Challenging your Beliefs and Values; Developing Ideas and Evaluating an Argument.

D. Observing, Describing and Framing the Problem; Comparing and Evaluating a Problem.

UNIT – V: Writing Skills (3 Weeks)

A. Speech Versus Writing; Types of Writing; Writing for Specific Purposes (Essays, Letters, and Reports, Etc.).

B. Language and Style of Writing: Dealing with New Words (Academic Vocabulary Building), Summarizing and Paraphrasing Techniques.

C. Academic Writing Components; Development of Academic Language; Activities to Develop Academic Writing Skills.

D. Developing Critical, Analytical, and Interpretive Thinking Skills.

5.1.3 Practicum

Following are the suggestive practicals and activities. The teachers may design more tasks based on classroom interactions and discussions.

1. How do you interpret every day and reflect upon what you read? Prepare a report.
2. Analyze a recorded video from the perspective of voice and pronunciation and write a report.
3. Observing, describing and framing a problem and evaluating it.
4. Perform role play in different conversational contexts.
5. Listen to recorded audio on any topic of your interest and note the relevant points (note-taking).

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5.1.4 Mode of Transaction

The entire syllabus is based on practical exercises. Teaching this course will involve a combination of interactive sessions and practicals involving discussion, role plays, projects, simulations, workshops, and language-awareness activities. The course intends deeper approaches to learning, such as classroom discussions, critical thinking, problem-solving abilities, and verbal/non-verbal effective communication among the learners. It also focuses on daily life situations where one would perform tasks involving a natural integration of language skills. The course requires the active participation of students. The students are expected to read the assigned chapters/articles before the session.

5.1.5 Mode of Assessment

The assessment of the learner will be primarily based on the assessment of both linguistic and communicative skills using a range of activities, group work and projects.

The examination scheme and mode shall modify and/or evolve as per the guidelines of the examination Branch, University of Delhi, from time to time.

Assessment Component	Total Marks
Cumulative Assessment (CA)	40
End-Term Project/ Activity Bank	80
Viva-Voce	40
Total	160

5.1.6 Suggestive Reading Materials

- पाण्डेय, ल. (संपादक) (2008). *पढ़ना सिखाने की शुरुआत.* राष्ट्रीय शैक्षिक अनुसंधान और प्रशिक्षण परिषद्.
- पाण्डेय, ल. (संपादक) (2008). *पढ़ने की समझ.* राष्ट्रीय शैक्षिक अनुसंधान और प्रशिक्षण परिषद्.
- पाण्डेय, ल. (संपादक) (2009). *पढ़ने की दहलीज़ पर.* राष्ट्रीय शैक्षिक अनुसंधान और प्रशिक्षण परिषद्.
- बोरा, रा. (1993). *ऐतिहासिक भाषा विज्ञान.* हिंदी माध्यम कार्यान्वयन, दिल्ली विश्वविद्यालय.
- मीमांसक, यु. (1963) *संस्कृत व्याकरण शास्त्र का इतिहास,* भारतीय प्राच्य विद्या प्रतिष्ठान.
- शिक्षा एवं समाज कल्याण मंत्रालय. (2018), भाषा शिक्षण हिंदी | भाग-1 ,राष्ट्रीय शैक्षिक अनुसंधान और प्रशिक्षण परिषद्. ISBN 978-93-5292-018-1
- शिक्षा एवं समाज कल्याण मंत्रालय. (2019). भाषा शिक्षण हिंदी | भाग –2,राष्ट्रीय शैक्षिक अनुसंधान और प्रशिक्षण परिषद्. ISBN 978-93-5292-152-2
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- Agnihotri, R. K. (1996). Kaun bhasha kaun boli. *Sandarbh* 13, 37-43.
- Agnihotri, R. K. (2009). Language and dialect. *Learning curve*, *13*.
- Atwell, N. (1987). *In the middle: Writing, reading, and learning with adolescents*. Heinemann Educational Books.
- Kaushik, S. (Editor) (2009). *Reading for Meaning*, NCERT.
- Khubchandani, C. M. (ed.) (1988) Language in a plural society. IIAS.
- Krashen, S. (1982). *Principles and practice in second language acquisition*. Pergamon Press Inc.
- Kumar, G. (2019). *Hindi bhasha shikshan.* Pragatishil Prakashan.
- Kumar, G. (2020) Vividharupini Hindi Bhasha: Sanikshatmak Vimarsh. *Bhasha*. Kendriya Hindi Nisheshalay, MHRD (Bharat Sarkar).
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- Lightbown, P. M., & Spada, N. (2013). *How Languages are Learned (4th ed.)* Oxford University Press. www.oup.com/elt/teacher/hlal.
- Rai, G. (2021). Teaching of literature in multilingual context: an approach for social justice. ELT Voices, *International Society for Educational Leadership, 2* (1), ISSN No. 2230-9136.
- Rai, G. (2023). Adopting multilingualism in the Indian classrooms. In U. Pathak, & C. Thapa (Eds.), *Pedagogical diversity in education sector* (pp. 16-29*)*. University Book House Ltd. 978-93-95215-13-8.
- Rai, M. (2015). Writing in Indian schools: The product priority. Language and language learning. *4*(7), 32-36.
- Swami, D. (2010). *Varnochacharan shiksha*. Ram Lal Kapoor Trust.

5.1.7 ADDITIONAL READINGS

- Bloomfield, L. (1933). *Language.* George Allen & Unwin Ltd.
- Britton, J. (1972). Language and learning. Pelican Books.
- Kumar, K. (2004). The Child's Language and the Teacher : A Handbook. National Book Trust. Delhi.
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- National Curriculum Framework for Foundational Stage 2022, NCERT. New Delhi
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- Rosenblatt, L. M. (1980). What facts does this poem teach you? *Language Arts*, *57*(4), 386-394.

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- Sapir, E. (1949) Forms in language: grammatical process. In E. Sapir (Ed.) L*anguage: An introduction to the study of speech.* Harcourt Bruce.
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AE & VAC: 5.2: Language - 2 (Other than L1)

CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course Title & Code	Credits	Credit Distribution of the Course			Eligibility Criteria	Pre-requisite
		Lecture	Tutorial	Practical/Practice		
Language - 2 (Other than L1) **AE & VAC: 5.2**	4	-	-	4	Class XII	Nil

5.2.1 About the Course and Learning Objectives

The course aims to prepare the students for the sound systems of languages, word formation processes, sentence formation, semantic and pragmatic aspects of languages. The course intends to enable the learners to integrate all four language skills using different genres. The major aim of this course is to empower the learners to contribute to the discourses on various issues and themes. The course also orients the students to the use of different technology and digital media for developing their own communicative skills as well as the school students they would teach in the future. The course helps improve basic communication skills such as listening, speaking, reading, and writing skills among L2 language learners. The course is designed to enhance knowledge of the grammar of L2 and enable the students to formulate grammatically correct and contextually appropriate sentences and words and empower the students with summarizing skills, and oral presentation skills effectively. The course also seeks to enhance students' critical thinking capacities, demonstrate effective communication skills and provide hands-on activities to student teachers to develop their language skills through practical sessions.

5.2.2 Learning Outcomes

After completing the course, it is expected that the student teachers will be able to:

- define the needs and importance of multilingualism, the relationship between multilingualism and scholastic achievement.
- demonstrate reading, writing, listening, speaking, and critical thinking abilities in L2.
- recognize the link between language and cognitive skills and apply their knowledge

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and skills effectively for all purposes.

- build interpersonal relationships and enhance social skills.

UNIT – I: Language, Society, and Learning (4 Weeks)

A. Bi-/Multilingualism: Conceptual Understanding and Scholastic Achievements; Language Variation and Social Variation; Languages Versus Dialects, Cultural Transmission of Language, Language and Gender; Language and Identity; Language and Power; Constitutional Provisions and National Education Policy 2020.

B. Language Acquisition and Language Learning; Language Learning from Mother Tongues to Other Tongues; Advantages of Learning other Languages; Language and Education; Notion of First Language, Second Language and Others.

UNIT – II: Understanding Grammar (4 Weeks)

A. Arbitrariness in Language; Classification Sessions of Speech Sounds: Vowels, Consonants, and Others; Suprasegmental: Stress, Pitch, Tone, Intonation, and Juncture; Acoustic Phonetics.

A. Word and Meaning; Parts of Speech, Grammatical Categories; Word Formation: Affixation, Compounding, Reduplication, Vocabulary Building.

B. Sentence and its Constituents: Simple, Complex, and Compound Sentences; Semantics and Pragmatics: Lexical Meaning- Synonymy, Antonymy, Meronymy, Grammatical Meaning, Speech Acts.

UNIT – III: Basic Communication Skills in L2 (4 Weeks)

A. Pronunciation and Listening Comprehension Skills.

B. Reading and Reading Comprehension Skills.

C. Writing Systems: Speech and Writing; Types of Writing Systems.

D. Effective Writing Skills; Effective Presentation and Speaking Skills; Summarizing and Paraphrasing Skills.

UNIT – IV: Critical Reading and Thinking Skills (3 Weeks)

A. Components of Critical Thinking and Reading; High Order Cognitive Development; Critical Thinking and Problem-Solving; Rational Inquiry.

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5.2.3 Practicum

Following are the suggestive practicals and activities. The teachers may design more tasks based on classroom interactions and discussions.

1. Listen to a recorded speech and classify it based on sounds: vowels, consonants, and others; suprasegmental: stress, pitch, tone, intonation, and juncture; Acoustic phonetics.
2. Compare and analyze the language structure of L1 and L2 in any context (sound, morpheme, semantics and syntax, etc.)
3. Analyze sentences and their constituents as simple, complex, and compound sentences from written work.

5.2.4 Mode of Transaction

The entire syllabus is based on practical exercises. Teaching this course will involve a combination of interactive sessions and practicals involving discussion, role plays, projects, simulations, workshops, and language-awareness activities.

The course intends deeper approaches to learning, such as classroom discussions, critical thinking, problem-solving abilities, and verbal/non-verbal effective communication among the learners. It also focuses on daily life situations where one would perform tasks involving a natural integration of language skills. The course requires the active participation of students. The students are expected to read the assigned chapters/articles before the session.

5.2.2 Mode of Assessment

The assessment of the learner will be primarily based on the assessment of both linguistic and communicative skills using a battery of tests and test types, group work and projects.

The examination scheme and mode shall modify and/or evolve as per the guidelines of the Examination Branch, University of Delhi, from time to time.

Assessment Component	Total Marks
Cumulative Assessment (CA)	40
End-Term Project/ Activity Bank	80
Viva-Voce	40
Total	160

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5.2.6 Suggestive Reading Materials

- पाण्डेय, ल. (संपादक) (2008). *पढ़ना सिखाने की शुरुआत.* राष्ट्रीय शैक्षिक अनुसंधान और प्रशिक्षण परिषद्.
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AE &VAC: 5.3 : Arts (Performing and Visual) and Creative Expressions

CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course Title & Code	Credits	Credit Distribution of the Course			Eligibility Criteria	Pre-requisite
		Lecture	Tutorial	Practical/Practice		
Arts (Performing and Visual) and Creative Expressions **AE &VAC: 5.3**	2	-	-	2	Class XII	Nil

Option 1 - Collage-Making

5.3.1 About the Course and Learning Objectives

Engagement with various forms of art as self-expression and the need to develop sensibility to appreciate them has been an important concern in educational theory and practice. This concern is premised on the claim that forms of self-expression contribute immensely to the development of cognitive, affective and psycho-motor dimensions among children, as well as that through one or another art form, children come to explore ways of expressing themselves. Further, it is also the case that critical appreciation of art enables children to form judgments of a very special kind, namely, aesthetic judgment. This enables students as they grow into adults to have focused attention on making sense of and appreciating cultural productions.

Children enjoy artwork a lot. They explore and find meaning in artwork. Their psycho-motor skills get developed through art. The huge element of socialization is acquired through different forms of art. They get to know each other and understand each other and make friends through art. They develop their peer group through getting involved in art forms. Learning to work with others is also achieved through art. It gives them space to think independently, create and reflect. It is one space where all the three are involved- hand, head, and heart.

Therefore, educational practitioners that the students aim to be, will need to bring an element of art in practices that they engage in. To be able to do this, they need an appreciation of art in general, familiarity with one art form, and basic skills and capabilities to be creative and artful. Additionally, they should be familiar with some critical debates in art education, even if their work is in other subject areas.

To this end, students will do one course that aims to help them recognize and appreciate the *importance of aesthetic judgment, develop familiarity with an art form* and basic skills to be *creative and artful in their expressions*. Skills develop from practice, therefore hands-on training in doing art will be emphasized in this course. This course aims to help students

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develop a habit of performing skillful activities that are essentially aesthetic and artful which is expected to contribute to other educational practices that they develop in other courses in the programme.

Therefore, this course will explicitly relate this skill to activities that practitioners of education engage in, like teaching, development of teaching-learning material, and content of other subject areas wherever possible.

Collage as Visual Art Medium

A major aspect of collage, and one that is sometimes overlooked, is the incredibly diverse array of materials and objects that can be used. Collecting interesting materials is an ongoing activity for artists and for those who teach collage. But it is just as important for young people to hunt for and make decisions about materials they would like to incorporate into their work. All materials, and the alterations that artists make to them, are suggestive of ideas and concepts based on their surfaces, forms, textures, degree of transparency and opacity, color, and other visual characteristics. Materials also connect us, through association and reference, to social and cultural worlds and places. What ideas might a scrap of newspaper, as a collage material, express? How might these meanings differ from those of, say, feathers? Or twigs? Or a thin piece of plastic cut out from a plastic bag?
Working with and creating artwork in Collage involves various aspects: selecting materials, manipulating materials, investigating materiality, closely observing materials, discovering possibilities, composing, designing the artwork, planning, finding solutions, applying solutions, thinking flexibility, decision-making, researching, using imagination, expressing, taking creative risks, develop perseverance, and much more. Students will also be introduced to various aspects of art in education: The value of art and artmaking by itself, art's use as an instrument in education, social and moral dimensions of art, and the controversial perceptions around good art and bad art.
This course aims for students to understand the importance of aesthetics and art in education, the role art can play in education, and mainly to appreciate, understand and gain skills with the medium of collage and its techniques.

5.3.2 Learning Outcomes

After completion of this course, it is expected that the students will be able to:

- articulate the importance and the role of aesthetics and art in education;
- understand the medium of collage and its versatility;
- design, plan, and create an expressive self-portrait collage by applying a variety of collage techniques;
- design and set up an interactive visual art exhibition to display their artworks;
- understand and appreciate art-based learning experiences;
- develop the ability to reflect and challenge their assumptions and beliefs around art and develop new understandings.

UNIT – I: Understand the Importance of Aesthetics and Art in Education (1 Week)

Students will collectively view and engage in a series of artworks closely, share their observations, critically analyze their observations, listen to multiple perspectives from peers, suspend judgements, and draw their own understanding of the artwork. They will gain familiarity with the role of art in education and will recognize aesthetic experiences through compare and contrast.

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A. Introduction to Art and Aesthetics.
B. Visual Thinking Strategy (VTS) Activity.
C. Learning Art Forms (Warli, Madhubani, Gond Art and Others) – Any One.
D. Art as Self–Expression and its Application in Education.

UNIT-II: Exploring paper collage and its techniques (2 Weeks)

Students will view and discuss examples of collage artworks; artist process and artist interview videos Students will get a chance to compare and contrast various ways collage as a medium is used and will engage in discussions and dialogues. Students will analyze effective ways of using the medium of collage in educational and other settings.

A. Introduction to Collage and its Medium (Newspaper, Fabric, Ribbon, Coins, Feathers and others).
B. Manipulating Paper in Different Ways and Creating 2-D Composition of Paper Collage.
C. Creating Visual Texture, Physical Texture and Patterns Using Techniques Like (Decoupage, Photomontage, And 3 -D).

UNIT – III: Ideating and creating for an Expressive Self-Portrait (7 Weeks)

Students will engage in art making activities. Students will draw from their previous experiences of using paper for 2D explorations and add more interest to their unique 3D explorations. Students will continuously reflect on their learning through artwork. Students will work independently and collaboratively throughout the course.

A. Making Paper Stand and Create Paper Sculpture Using 3 -D Techniques (Like Paper – Cutting, Paper Folding, Clay, Paper- Mache).
B. Engaging in Close Observation Sketching and Drawing Activity (Self- Portrait, Poster, Calligraphy).
C. Expressive Self- Portrait Drawing and Collage

UNIT – IV: Designing and setting up an Exhibition (5 Weeks)

Designing, Planning and Setting Up an Art Exhibition.

5.3.3 Pedagogy

Students will be planning the various aspects of a visual art exhibition: ways to display artworks, designing the layout of the exhibition space and how the audience will move within the space. Students will divide the tasks among themselves and set up the exhibition space.

5.3.4 Mode of Transaction

The entire syllabus is based on practical exercises. The nature and scope of activities and tasks are explained in each unit.

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5.3.5 Mode of Assessment

The examination scheme and mode shall modify and/or evolve as per the guidelines of the Examination Branch, University of Delhi, from time to time.

S. No.	Assessment Task	Marks	Total Marks
CA	Appreciation and creation of any one artwork. Painting (A-3 or A-4 size) (on paper or cloth)	**5**	**20**
	Creation of any two-collage work using different medium and techniques (at least one paper collage)	**15**	
End-Term Project/Practical	• Creation of paper sculpture compositions using 3D technique. • Creation of self-portrait/calligraphy/poster. • Creation of an artwork on self-portrait collage. • Designing and setting up of an exhibition	**40**	**40**
Viva-Voce		**20**	**20**
Total		**80**	

5.3.6 References

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5.3.7 Resources

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https://www.youtube.com/watch?v=4u_G0G6Jog4

- Marcpaperscissor. (2016, Feb 28). Marc Paper Scissor: Cut collage Artist [Video]. You Tube. https://www.youtube.com/watch?v=WgRZlWl-Oh0
- Prairie Public. (2016, March 31). Amber Fletschock: Collage artist [Video]. You Tube. https://www.youtube.com/watch?v=aa7p1vYqUc4
- Planning templates for exhibition.
- Handouts out on Collage techniques and artist examples Works of Deborah Roberts, William Kentridge, Wangechi Mutu, etc.

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Course Title & Code	Credits	Credit Distribution of the Course			Eligibility Criteria	Pre-requisite
		Lecture	Tutorial	Practical/Practice		
Arts (Performing and Visual) and Creative Expressions **AE &VAC: 5.3**	2	-	-	2	Class XII	Nil

Option 2 – Theatre in Education

5.3.1 About the Course and Learning Objectives

The engagement with various forms of art as self-expression and the need to develop a sensibility to appreciate them has been an important concern in educational theory and practice. This concern is premised on the claim that forms of self-expression contribute immensely to the development of cognitive, affective, and psycho-motor dimensions among children, as well as that through one or another art form the children come to explore ways of expressing themselves. Further, it is also the case that critical appreciation of art enables children to form judgments of a very special kind, namely, an aesthetic judgment. This enables students as they grow into adults to have focused attention on making meaning of what surrounds them and appreciating cultural productions.

Children are naturally tuned to appreciate art, as it activates their senses. Further, their psycho-motor skills are developed through art. It gives them space to think independently, create and reflect while working with others. It is a unique space where all three are involved- hand, head and heart.

Therefore, students who aim to be educational practitioners will need to bring an element of art to the educational practices that they engage in. To be able to do this, they need an appreciation of art in general, familiarity with one art form, and basic skills and capabilities to be creative and artful.

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To this end, in the first semester, students will attend one course that aims to help them recognize and appreciate the importance of aesthetic judgment, develop familiarity with an art form and basic skills to be creative in their expressions. Skills develop from practice, therefore hands-on training in doing art will be emphasized in this course. This course aims to help students develop a habit of improvising on theatrical performances that include following aesthetic judgement at all stages, which will contribute to other educational practices that they develop in the larger programme. Therefore, this course will explicitly relate this skill to activities that practitioners of education engage in, like teaching, developing teaching-learning material, and producing content of other subject areas wherever possible.

Theatre and Drama in Education

Theatre is a collaborative art form, and it is inherently interdisciplinary in its nature. It comprises many facets and skills like acting, directing, writing, designing the sets and costumes, make-up, production, lights, sounds and music. All these elements and skill sets come together and are stitched in the form of a 'play' which is performed live, in front of an audience. In the Indian context, theatre has a deep-rooted history with its classical, folk, and other cultural forms until other contemporary forms of theatre evolved in recent times.

Theatre education for children can play a vital role in their individual, social, and emotional development. It teaches them the values of trust and interdependence, makes them confident to express themselves and helps them learn to work in a collaborative environment. It develops their ability to contextualise, critique and discuss certain questions and thoughts they encounter in everyday life. It further helps them imagine, explore, and create their own narratives.

In this course, we will briefly talk about the aesthetics of theatre and how theatre exists in different forms. The students will learn some basic theatre tools that will help them create and perform a narrative they collaboratively arrive at.

In simple terms one can say theatre has two major aspects i.e., creating the script and then performing it. Body is the primary instrument in any theatrical performance accompanied by text, material, visual and sound. This course will introduce students to these aspects of any theatre performance, in the form of direct experience by doing this themselves.

5.3.2 Learning Outcomes

After completion of this course, it is expected that the students will be able to:

- develop and foster the aesthetic sense and temperament in life;
- articulate the importance of aesthetics and art in education;
- demonstrate their familiarity with and appreciation of theatre and drama;

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- demonstrate basic theatre tools of improvisation, ideation, and the process of creating the thematic presentation;
- explain different theatrical pedagogies;
- create a short performance with educational possibilities;
- design a framework for the integration of theatre and drama in their respective subjects.

UNIT – I: Importance of Aesthetics and Art Education (1 Week)

In this unit, we will discuss examples of how theatre was used in social movements that have contributed to educating the larger population about important social issues. Exposing students to these approaches will lead to rich discussions on the role of theatre in pedagogy and practice.

Students will learn from the practices and approaches of theatre groups like Budhan Theatre which works with denotified tribes, and Manalmagudi which works closely with physical and nonverbal theatre and Jana Sanskriti Centre for Theatre established in 1985.

- The Value of Art Itself and its Use in Education.
- Identifying and Developing Aesthetic Sense Using Examples of Theatre/Drama.
- Introduction to Theatre in Education and Drama in Education.
- Use of Theatre/Drama in Social Movements.

UNIT – II: Introduction to Theatre, and Beginning with the Body (2 Weeks)

There will be several games, exercises, and drama conventions that will familiarize them with certain basics of movement, voice, and acting and thereby create improvisations and images in a given context to increase teachers' own self-awareness, awareness of the classroom environment and sensitivity towards the learner which helps them to break the stereotypical image of conventional teacher and converting into a progressive facilitator.

- Principles and Awareness on How to Use Body and Voice in a Given Space and Time.
- Exploring Different Roles, Characters, and Relationships to Identify and Portray Human Values, Attitudes, Intentions and Actions in Different Situations and Contexts.

UNIT – III: Arriving at a Script (4 Weeks)

Students will learn from everyday experiences of memory, sound and visuals, without a written text or spoken word. They will use the skills of improvisation they learned in Unit 2 to explore, ideate, create, and finally arrive at a script. Students will be encouraged to use their perspectives on themes around the education system or curricular areas, in converting the text into a script.

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Creating the connection between the text and the learner (emotional and experiential) they need to understand different theatrical pedagogies as mentioned above which they can use directly in their classroom environment at the same time they have to explore and create sessions around suggested pedagogical tools to enquire and understand their curricular themes.

- Introduction to Different Games, Exercises and Conventions of Theatre and Drama.
- Building Skills for Script Development and Adapting/Devising a Script aound Curricular Themes.
- Understanding Different Theatrical Pedagogies Such as Process Drama, Curriculum Drama, Mantle of Expert, Teacher in Role Etc.

UNIT – IV: Developing and Performing the Script (8 Weeks)

This unit enables them to use drama methods such as mantle of expert, process drama, Teacher in role and curriculum drama etc. and it facilitates their understanding of creating lesson plans for their respective subjects. The students will develop and design a session of learning content as a module which will be based on the process of drama and theatre technique.

Those who would choose to create a Theatre script based on their subject or interdisciplinary areas will engage in the making of a play. Apart from using their bodies to play characters, the students will also have to think about design and other aesthetic elements like sets, props, costumes, lights, music and sounds they want to use in the performance. Students will present the final text on stage.

- Developing and Designing Lesson Plans Using Drama Pedagogies for Their Respective Subjects and Developing and Designing Theatre Scripts on Their Respective Subjects or Interdisciplinary Areas.

- Creating a Session of Learning Content as a Module which will be based on the Process of Drama and Theatre Technique.

- Presentation of Drama Lesson Plans (Drama Programme), Reflection and Addressing Challenges and Possibilities

5.3.3 Pedagogy

Each unit has an overview of the classroom processes involved therein. Overall it is recommended that the pedagogy will be basically hands-on training. More emphasis is given to experiential learning. The students will learn through experience and by doing, they learn about theatre/ drama and its connection to education. The process takes them through different forms of theatre /drama methodologies like the mantle of expert, process drama, Teacher in role and curriculum drama etc,

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Storytelling (different Folklore), Folk theatre (Kathakali, Chhau, Bhavai, Yakshagaana, Jatra and Nautanki etc)

5.3.4 Suggestive Mode of Assessment

Assessment Tasks		
	Task	**Marks**
Cumulative Assessment **CA**	Critical Review of theatre forms/ theatre literature	**5**
	Demonstration of theatrical pieces based on their movement and speech./ verbal and non-verbal performance	**15**
End-Term Project/Practical	• Group improvisation based on any theme/content • Planning of their Script and Performance.	**40**
Viva-Voce		**20**
Total		**80**

5.3.5 Suggestive Reading Materials

- Anderson, M. (2012). *A Master Class & Drama Education: Transforming Teaching and Learning*. Continuum International Publishing group. ISBN: 978-1-4411-6700-2
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AE &VAC: 5.4.I: Understanding India Part I
(Indian Ethos and Knowledge Systems)

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Course Title & Code	Credits	Credit Distribution of the Course			Eligibility Criteria	Pre-requisite
		Lecture	Tutorial	Practical/Practice		
Understanding India (Indian Ethos and Knowledge Systems) AE &VAC: 5.4.I	2	-	-	2	Class XII	Nil

5.4.1 About the Course and Learning Objectives

At a time when the world finds itself deep in dynamism, led by technological innovations and environmental changes, there is a need for an inward-looking approach to building the young minds of a country. By looking inward, one not only finds a sociological belongingness but also a spiritual and intellectual rooting in these changing times. The course provides an overview of India's heritage and knowledge traditions across key themes of economy, society, polity, law, environment, culture, ethics, science & technology, and philosophy. It places special emphasis onthe application of these knowledge traditions, helping students to not only know and appreciate India's heritage and knowledge traditions but also to independently evaluate them through a multidisciplinary lens. This evaluation would produce valuable lessons for obtaining transferableand 21st-century skills. The course will establish foundational knowledge and build upon it. It will allow students to have a basic understanding of the traditions of India and how it has evolved over the years. The course is designed to enable student teachers to outline and interpret the processes andevents of the formation & evolution of knowledge of India through a multidisciplinary lens; to evaluate the diverse traditions of India to distinguish its achievements and limitations, and to develop and articulate an ethics-based education rooted in Indian thought to their students in the classroom context.

5.4.2 Learning Outcomes

After the completion of the course, it is expected that the students will be able to:

- recognize the vast corpus of knowledge traditions of India, while developing an appreciation for it,
- apply their acquired research and critical thinking skills to multidisciplinary themes, and-appreciate the diverse belief systems and knowledge traditions in India.
- discuss the formation and evolution of knowledge of India through a multidisciplinary lens.

UNIT - I

Introduction to the Knowledge of India (2 Weeks)

A. Definition & Scope; Relevance of this Knowledge.
B. Need to revisit our Ancient Knowledge, Traditions, and Culture.

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UNIT - II

Culture - Art and Literature (4 Weeks)

A. Fine Arts (Traditional Art Forms, Contemporary Arts, Arts and Spirituality, Arts and Identity, and Art and Globalization);
B. Performing Arts (Indian Dance Systems, Traditional Indian Pieces of Music, Visual Arts, Folk Arts, etc.,).
C. Literature (Sanskrit Literature, Religious Literature, Indian Poetry, Folk Literature, Indian Fiction, Sangam Literature, Kannada, Malayalam Literature, Bengali Literature, etc.

UNIT - III

Polity, Law and Economy (5 Weeks)

A. Kingship & Types of Government (Oligarchies, Republics); Local Administration (Village Administration);
B. Basis of Law: Dharma & its sources; Criminal Justice: Police, and Punishments; Lessons from Chanakyaniti; Lessons for modern-day India: Towards a Tradition-Driven Equitable and Just Polity and Law System.
C. Overview of the Indian Economy from the Stone Age to the Guptas: The new culture of Urbanization (including Castes, Guilds, and other Economic Institutions; Harappan Civilization Economy; Growth of Agriculture and Proliferation of New Occupations; Growth of Writing);
D. Internal & External Trade and Commerce, including Trade Routes, Indo-Roman Contacts, and Maritime Trade of South India; Temple Economy.
E. Land Ownership - Land Grants & Property Rights, Land Revenue Systems.
F. Understanding Arthashastra: Ideas & Criticism; Locating Relevance of Ancient Indian Economic Thought in Modern-Day Indian Economy.
G. Understanding Economy, Polity and Law in Contemporary India

UNIT - IV

Environment & Health (4 Weeks)

A. Understanding Equilibrium between Society & Environment: Society's Perceptions of Natural Resources like Forests, Land, Water, and Animals.
B. Sustainable Architecture & Urban Planning; Solving Today's Environmental Challenges (Best Practices from Indigenous Knowledge, Tribes and Community-Led Efforts, etc.).
C. India's Health Tradition: Ayurveda, Siddha, Ashtavaidya, Unani, and other Schools of Thought; Lessons from Sushruta Samhita and Charaka Samhita;
D. Mental health in Ancient India: Towards Time-Tested Concepts of Mental Wellness (Concept of Mind, Dhyana, Mind-Body Relationship, Ayurveda, Yoga Darshan, Atman, etc.)

5.4.3 Practicum

The modes of curriculum transaction will include lectures, Tutorials, and Practicum.

- Practicum will include organization of day trips that help student teachers watch eventsrelating to visual and performing art; activities that enable student teachers to identify and record through photos, videos, etc. the elements of ancient architecture still existingin the city around them; organization of Individual and group presentations based on themes such as Polity, Law and Economy etc., organization of a 'Knowledge of India' day in the institution to celebrate the culture (food, clothes, etc.) that they would have been explored in lectures and

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tutorials; interactions with family members, elders, neighbours, and other members of society about the evolution of local systems and economy etc.

5.4.4 Mode of Transaction

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

5.4.5 Mode of Assessment

The approaches to learning assessment will include:

- Supporting the curiosity and interest of student teachers in the selected themes through a multi-modal approach, including regular assessments and actionable feedback that enablelearners to outline and interpret the processes and events of the formation & evolution of knowledge of India through a multidisciplinary lens.
- Enabling the student teachers to demonstrate critical analysis and independent thinking ofthe processes and events in the formulation & evolution of different traditions that help student teachers evaluate the diverse traditions of India to distinguish its achievements andlimitations.
- Use of first-hand or second-hand experiences that enable student-teachers to develop and articulate an ethics-based education rooted in Indian thought to their students in the classroom context.

The examination scheme and mode shall modify and/or evolve as per the guidelines of the Examination Branch, University of Delhi, from time to time.

Assessment Component	Total Marks
Cumulative Assessment (CA)	20
End-Term Project/ Activity Bank	40
Viva-Voce	20
Total	80

5.4.6 Suggestive Readings Material

Teachers may suggest books/readings as per the needs of the learners and learning content.

- धर्मपाल·) २०१० ·(*भारत की परंपरा,* पुनुर्थान ट्रस्ट·
- भारत : सांस्कृतिक विविधिता में एकता) *2022(,* एनसीईआरटी·
- मुख़र्जी, राधा कुमुद) २०२० (*प्राचीन भारत*) १३ वां संस्करण(, राजकमल प्रकाशन·
- योग :स्वस्थ जीने का तरीका) *2018(,* एनसीईआरटी·

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- विद्यालंकार, स·) २०१४ .(*भारतीय संस्कृति का विकास*, श्री सरस्वती सदन, रोहिणी·
- विद्यालंकार, स·) २०१३ .(*प्राचीन भारत का धार्मिक, सामाजिक और आर्थिक जीवन*,
- शर्मा, रा·) २०१५ ·(*भारतीय इतिहास : एक पुनर्विचार* ·हिंदी माध्यम कार्यान्वयन, दिल्ली विश्वविद्यालय
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- शर्मा, रा·)२०२० .(*आर्य एवं हड़प्पा संस्कृतियों की भिन्नता*,राजकमल·
- सरकार ,सु·) २०१७(· *आधुनिक भारत*. राजकमल प्रकाशन·

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AE &VAC: 5.4.II: Understanding India Part II
(Indian Ethos and Knowledge Systems)

CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course Title & Code	Credits	Credit Distribution of the Course			Eligibility Criteria	Pre-requisite
		Lecture	Tutorial	Practical/Practice		
Understanding India (Indian Ethos and Knowledge Systems) AE &VAC: 5.4.II	2	-	-	2	Class XII	Nil

5.4.1 About the Course and Learning Objectives

At a time when the world finds itself deep in dynamism, led by technological innovations and environmental changes, there is a need for an inward-looking approach to building the young minds of a country. By looking inward, one not only finds a sociological belongingness but also a spiritual and intellectual rooting in these changing times. The course provides an overview of India's heritage and knowledge traditions across key themes of economy, society, polity, law, environment, culture, ethics, science & technology, and philosophy. It places special emphasis onthe application of these knowledge traditions, helping students to not only know and appreciate India's heritage and knowledge traditions but also to independently evaluate them through a multidisciplinary lens. This evaluation would produce valuable lessons for obtaining transferableand 21st-century skills. The course will establish foundational knowledge and build upon it. It will allow students to have a basic understanding of the traditions of India and how it has evolved over the years. The course is designed to enable student teachers to outline and interpret the processes andevents of the formation & evolution of knowledge of India through a multidisciplinary lens; to evaluate the diverse traditions of India to distinguish its achievements and limitations, and to develop and articulate an ethics-based education rooted in Indian thought to their students in the classroom context.

5.4.2 Learning Outcomes

After the completion of the course, it is expected that the students will be able to:

- recognize the vast corpus of knowledge traditions of India, while developing an appreciation for it,
- apply their acquired research and critical thinking skills to multidisciplinary themes, and-appreciate the diverse belief systems and knowledge traditions in India.
- discuss the formation and evolution of knowledge of India through a multidisciplinary lens.

UNIT - I
Philosophy, Ethics & Values: Schools of Philosophy (4 Week)

A. Vaishesika, Nyaya, Samkhya, Yoga, Purva Mimansa and Vedanta or Uttara Mimansa (theory and the major thinkers) – and Jain, Buddhist, and Charvak traditions.

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B. Vedanta: Philosophical Systems (Advaita, Vishishtadvaita, Dvaita).
C. Ethics, Morality, and Social Dilemma (including Self-Leadership) and their relevance in today's time.
D. How do Indians value spirituality? Spirituality and Social Responsibility; Importance of Spirituality in current times.
E. Using Ethics in a Technologically Volatile World: leading an ethical and modern life.
F. Practical Vedanta for Well-Being (mindfulness, inter-connectedness, society-self relationship, etc.).

UNIT - II
Culture- Lifestyle (4 Weeks)

A. Food (regional cuisines, Ayurvedic Diet, Food and Festival, Food, Hospitality, and Globalization).
B. Clothes (Traditional Indian Clothing, Textile Arts, Religious Costumes, Clothing Status, Clothing, Gender, Globalization in Clothing).
C. Sports (Traditional Indian Sports, Martial Arts, Sports and Gender, Sports & Globalization).
D. The Lifestyle of Yoga; Adapting Ancient Lifestyle – A path towards longevity.

UNIT - III
Science & Technology (4 Weeks)

A. Arithmetic and logic.
B. Natural Sciences: Mathematics, Physics, Metallurgy, and Chemistry.
C. Astronomy: India's Contributions to the World.
D. Indian Notions of Time and Space.
E. Technology in the Economy: Agriculture, Transportation, etc.

UNIT - IV
Linguistic Traditions (3 Weeks)

A. History of Linguistics in India (Conceptualizing Ancient Indian Linguistics, Oral Traditions, etc.).
B. Language as Culture: Evolution of Languages over the years & Language as Building Blocks to different Cultures and Society
C. Language: Identity, Culture, and History.

5.4.3 Practicum

The modes of curriculum transaction will include lectures, Tutorials, and Practicum.

- Practicum will include organization of day trips that help student teachers watch eventsrelating to visual and performing art; activities that enable student teachers to identify and record through photos, videos, etc. the elements of ancient architecture still existingin the city around them; organization of Individual and group presentations based on themes such as Polity, Law and Economy etc., organization of a 'Knowledge of India' day in the institution to celebrate the culture (food, clothes, etc.) that they would have been explored in lectures and tutorials; interactions with family members, elders, neighbours, and other members of society about the evolution of local systems and economy etc.

5.4.4 Mode of Transaction

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

5.4.5 Mode of Assessment

The approaches to learning assessment will include:

- Supporting the curiosity and interest of student teachers in the selected themes through a multi-modal approach, including regular assessments and actionable feedback that enablelearners to outline and interpret the processes and events of the formation & evolution of knowledge of India through a multidisciplinary lens.
- Enabling the student teachers to demonstrate critical analysis and independent thinking ofthe processes and events in the formulation & evolution of different traditions that help student teachers evaluate the diverse traditions of India to distinguish its achievements andlimitations.
- Use of first-hand or second-hand experiences that enable student-teachers to develop and articulate an ethics-based education rooted in Indian thought to their students in the classroom context.

The examination scheme and mode shall modify and/or evolve as per the guidelines of the Examination Branch, University of Delhi, from time to time.

Assessment Component	Total Marks
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End-Term Project/ Activity Bank	40
Viva-Voce	20
Total	80

5.4.6 Suggestive Readings Material

Teachers may suggest books/readings as per the needs of the learners and learning content.

- उपाध्याय, आ. ब. (1979), *भारतीय दर्शन की रूपरेखा,* चौखंभा ओरिएंटलिया.
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CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course Title & Code	Credits	Credit Distribution of the Course			Eligibility Criteria	Pre-requisite
		Lecture	Tutorial	Practical/Practice		
Teacher and Society **AE &VAC: 5.5**	2	-	-	2	Class XII	Nil

5.5.1 About the Course and Learning Objectives

The focus of the course on 'Teacher & Society' is on developing an understanding among student teachers of the roles of teachers in the emerging Indian society, including the changing roles of teachers in the context of the global flows of people, culture, and resources that are shaping society, and the application of technologies that are constantly redefining not only the educational landscape but also the human relationships and social norms which are continuously undergoing change which entails a recalibration of the teacher roles aligned to the current and future realities and preparing teachers for the volatile, uncertain, complex and ambiguous world. The course enables the students to understand the roles and obligations of teachers as an architect of society based on cultural ethos, traditions, and diversity. The student teachers shall be equipped with the knowledge, capacities, and value system that enables them to act as an agent for fostering national integration, and a feeling of pride in the cultural heritage and achievements of India. This course also aims to ensure that student teachers understand their responsibility for producing a future generation that undertakes its responsibility as an awakened citizen who avoids wastage of national resources and takes up a proactive role in the emergence of India as a strong and disciplined nation.

In addition to these, the course also seeks to enable each of the student teachers to respond to the needs of students from diverse cultural, linguistic, social, and economic backgrounds; to be sensitive to gender issues; promote tolerance and social cohesion; provide special attention to students with disabilities; learn and apply new pedagogies and technologies; keep pace with current educational developments and initiatives; and keep oneself professionally engaged to update/upgrade knowledge and practice. The course also explores the relationship of the teacher with education development, community, and society.

5.5.2 Learning Outcomes

After completion of the course, it is expected that the student teachers will be able to:

- examine the relationship between teacher beliefs, values, character, social and cultural context, and teaching critically,
- conceptualize teacher agency, its individual, contextual, and structural dimensions, and how it gets impacted and in turn shapes education.

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- explain the teacher's roles and characteristics; the personal and professional self; the reflective practitioner, and their significant role in shaping self, school, and society,
- demonstrate a critical understanding of the Pedagogy of Ethic of Care in Teacher Education.
- reflect on Individual and collective pedagogical practices so as to improve learning and teaching,

UNIT – I: Understanding the Teacher: Exploring the Personal and Professional Being (5 Weeks)

A. Exploring the Social Context of Teacher: Teacher Beliefs, Values and Aspirations, Diverse Identities, Social Contexts and Commitment to Learning and Education.
B. Teacher as a Professional: Qualifications, Attitude, Aptitude, Experience.
C. The Reflective Practitioner: Nurturing the Professional Competencies through Collaborative and Collective Engagement with Self, Others, and the Social Context.

UNIT – II: Nurturing the Teacher: A Dialogue Beyond the Curricular Goals, for Life and Posterity (5 Weeks)

A. Teaching: One profession many roles
B. Holistic Teacher Development: Nurturing the Panchakoshas.
C. Developing Pedagogy of Ethic of Care in Education
D. Being a Critical Teacher: Role of Teacher in Shaping the Educational Policy, Practice, and Reforms

UNIT – III: Understanding Teachers' Agency: Shaping Education Systems and Society (5 Weeks)

A. Teachers' Agency: Individual, Cultural and Structural Dimensions; Challenges and Issues: Performativity, Non-academic Engagements, Systemic Apathy, Policy and Practices.
B. Teacher Discourses: Engaging in Critical Education, Dialogues on Power Relations associated with Gender, Ethnicity, Culture, Disability, Caste, Class, Poverty; the Reproduction of Disadvantage, and Realizing the True Human Potential.
C. Being a Critical Teacher: Raising Debates around Rapid Technological Advancement and Impact on Individual, Family, and Social Life.
D. Conceptualization of Teacher, Teaching, and Teacher Roles, 'Globalization' and the Reconstructed Nationalism Shaping the Socio-Political Milieu and Impact on the Social Psyche, Growing Materialistic Urge, Sensory Drives, and the Gradual Deterioration of the Individual and Societal Character.

5.5.3 Practicum

Following are the suggestive practicals and activities. The teachers may design more tasks based on classroom interactions and discussions.

- Take up a case study of any one teacher education Institution.
- Write a biography of any one of your favourite teachers/ Educationists.

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5.5.4 Mode of Transaction

Teacher and Society is a reflection-based course that invites teachers to re-think teachers and teaching. It awakens and inspires teachers to realize broader educational aims through an action and reflection cycle. The approach therefore would include a blend of lectures, in-class seminars, thinking exercises, critical reflections, group work, case-based approaches, and enquiry-based learning.

- Learners would also be exposed to case studies featuring teachers from a representative cross-section of Schools in India and critically analyze their exercise of agentic force in school improvement and the improvement of teaching practice.
- Situating themselves in the geo-political context, the learners will get to critically engage in some of the policy dialogues.
- Learners would reflect on their practice as pre-service interns, knowledge, skills, and understandings—and identify opportunities to apply course learnings to their school context.

5.5.5 Mode of Assessment

The entire syllabus is based on practical exercises. Being a very thought-provoking course, the assessment would largely include critical thinking kind of assignments. The following are some exemplars.

- Write your current teaching philosophy based on your beliefs and values.
- Choose any one area of immediate societal concern like environmental degradation, increasing crime against women, cybercrimes, bullying or any other and draw an action plan that you as a teacher would undertake to mobilize self, school and society towards betterment.
- Critical Reflections on popular debates around power relations associated with Gender, Ethnicity, Culture, Disability, Class, Poverty, and others
- These are just prototypes and institutes may choose either of these or think of other innovative assignments that would inculcate in future teachers a sense of belonging to society.

The examination scheme and mode shall modify and/or evolve as per the guidelines of the Examination Branch, University of Delhi, from time to time.

Assessment Component	Total Marks
Cumulative Assessment (CA)	20
End-Term Project/ Activity Bank	40
Viva-Voce	20
Total	80

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Teachers may suggest books/readings as per the needs of the learners and learning content.

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Annexure-2

Integrated Teacher Education Programme ITEP

Curriculum Structure and Course Syllabi
Semester 1 & 2

Secondary

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CURRICULAR STRUCTURE OF INTEGRATED TEACHER EDUCTAION PROGRAMME Secondary (OPTION 1)

Table 1. ITEP Structure

S. No	Curricular Component	Courses	Credits per semester								Total Credits per course	Total Credits
			S-1	S-2	S-3	S-4	S-5	S-6	S-7	S-8		
1.	1. Student Induction programme	Two-week student induction Programme		--	--	--	--	--	--	--	--	
2.1	2. Foundation of the Education	Evolution of Indian Education	4	--	--	--	--	--	--	--	4	34
2.2		Sociological Perspectives of Education	--	4	--	--	--	--	--	--	4	
2.3		Child Development & Education Psychology	--	--	4	--	--	--	--	--	4	
2.4		Philosophical Perspectives of Education	--	--	--	4	--	--	--	--	4	
2.5		Inclusive Education	--	--	--	--	2	--	--	--	2	
2.6		Curriculum Planning & Development (textbooks, Material, development, etc.) – (stage-specific)	--	--	--	--	2	--	--	--	2	
2.7		Assessment and Evaluation	--	--	--	--	--	2	--	--	2	
2.8		Perspectives on School Leadership & Management	--	--	--	--	--	--	2	--	2	
2.9		Research in Education- I	--	--	--	--	--	2	--	--	2	
2.10		Research in Education- II	--	--	--	--	--	--	2	--	2	
2.11		Education Policy Analysis	--	--	--	--	--	--	--	2	2	
2.12		One Elective from offered courses as per the choice of student teacher (e.g., Adolescence education, Education for Mental Health, Education for sustainable development, Emerging Technologies in Education, Gender Education, Guidance and Counselling, Human Rights Education, Peace Education, Sports and fitness education, Tribal Education, Economics of Education or any other relevant course decided by university / Institution)	--	--	--	--	--	--	--	4	4	
3.1	3. Disciplinary/Inter-disciplinary courses	One/two discipline(s) from any of the school curricular areas i) Languages ii) Physical Sciences (Physics., Chemistry, etc.) iii)Biological Sciences (Zoology, Botany, etc.) iv)Mathematics v)Social Sciences &Humanities (Economics, History, Geography, Psychology, Political Science, etc.) vi) Business Studies vii) Arts (Visual and Performing) viii) Physical Education and Yoga ix) Vocational Education x) Computer Science Xi) Agriculture xii) Home Science xiii) Any other school subjects	8	12	12	12	12	8	--	--	64	64 Discipline A-64 Or Discipline A-48 & Discipline B-16 *(Discipline A & B may be from the same curricular Area.)*

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4.	4. Stage-Specific Content-cum- Pedagogy Courses		stage specific Content-cum- pedagogy courses	--	--	4	4	4	4			16	16
5.1	5.	Language Proficiency	Language -I (as per the 8th schedule of the constitution of India)	4		--	--	--	--	--	--	4	28
5.2			Language -II (other than language -I)	--	4	--	--	--	--	--	--	4	
5.3.A		Ability Enhancement & Value-Added Courses	Art Education (Performing and Visual)	2					2			4	
5.4.I			Understanding India Part I (Indian Ethos and Knowledge System)	2								4	
5.4.II			Understanding India Part II (Indian Ethos and Knowledge System)		2								
5.5			Teacher and Society	2								2	
5.6			ICT in Education				2					2	
5.7			Mathematics and Quantitaive Reasoning						2			2	
5.8			Sports, Nutrition and Fitness			2						2	
5.9			Yoga and Understanding self								2	2	
5.10			Citizenship Education, Sustainability and Environment Education								2	2	
6.1	6. School Experience		Pre-Internship Practice (Demonstration lessons, Peer teaching)					2				2	20
6.2			School Observation						2			2	
6.3			School-Based Research Project								2	2	
6.4			Internship in Teaching							10		10	
6.5			Post- Internship (Review and Analysis)								2	2	
6.6			Creating Teaching Learning Material/ Work Experience (Educational Toy Making, local/Traditional Vocations etc.)							2		2	
7.1	7. Community Engagement and Service		Community Engagement and Service (participation in NSS- related activities, New India Literacy Programme etc.)								2	2	2
8.1	8. Research Project/ Dissertation		Research Project/ Dissertation -I							6		6	12
8.2			Research Project/ Dissertation -II								6	6	
			Total	22	22	22	22	22	22	22	22	176	

24.11.23

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CURRICULAR STRUCTURE OF INTEGRATED TEACHER EDUCATION PROGRAMME Secondary OPTION 2

Table 1: ITEP Structure

S. No	Curricular Component	Courses	Credits per semester								Total Credits per course	Total Credits
			S-1	S-2	S-3	S-4	S-5	S-6	S-7	S-8		
1.	1. Student Induction programme	Two-week student induction Programme		--	--	--	--	--	--	--	--	
2.1	2. Foundation of the Education	Evolution of Indian Education	4	--	--	--	--	--	--		4	34
2.2		Sociological Perspectives of Education		4							4	
2.3		Child Development & Education Psychology			4						4	
2.4		Philosophical Perspectives of Education				4					4	
2.5		Inclusive Education					2				2	
2.6		Curriculum Planning & Development (textbooks, Material, development, etc.) – (stage specific)					2				2	
2.7		Assessment and Evaluation						2			2	
2.8		Perspectives on School Leadership & Management							2		2	
2.9		Research in Education- I						2			2	
2.10		Research in Education- II							2		2	
2.11		Education Policy Analysis								2	2	
2.12		One Elective from offered courses as per the choice of student teacher (e.g., Adolescence education, Education for Mental Health, Education for sustainable development, Emerging Technologies in Education, Gender Education, Guidance and Counselling, Human Rights Education, Peace Education, Sports and fitness education, Tribal Education, Economics of Education or any other relevant course decided by university / Institution)								4	4	
3.1	3. Disciplinary/Inter-disciplinary courses	One/two discipline(s) from any of the school curricular areas i) Languages ii) Physical Sciences (Physics., Chemistry, etc.) iii)Biological Sciences (Zoology, Botany, etc.) iv)Mathematics v)Social Sciences &Humanities (Economics, History, Geography, Psychology, Political Science, etc.) vi) Business Studies vii) Arts (Visual and Performing) viii) Physical Education and Yoga ix) Vocational Education x) Computer Science Xi) Agriculture xii) Home Science xiii) Any other school subjects	8	12	12	12	12	8	4	8		76 Discipline A -48 & Discipline B-28 (Discipline A & B may be from the same curricular Area.)

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4.	4. Stage-Specific Content-cum- Pedagogy Courses	stage specific Content-cum- pedagogy courses	--	--	4	4	4	4	--	--	16	16
5.1	5. Ability Enhancement & Value-Added Courses — Language Proficiency	Language -I (as per the 8th schedule of the constitution of India)	4		--	--	--	--	--	--	4	28
5.2		Language -II (other than language -I)	--	4	--	--	--	--	--	--	4	
5.3.A		Art Education (Performing and Visual)	2					2			4	
5.4,I		Understanding India Part I (Indian Ethos and Knowledge System)	2								4	
5.4.II		Understanding India Part II (Indian Ethos and Knowledge System)		2								
5.5		Teacher and Society	2								2	
5.6		ICT in Education				2					2	
5.7		Mathematics and Quantitative Reasoning						2			2	
5.8		Sports, Nutrition and Fitness			2						2	
5.9		Yoga and Understanding Self								2	2	
5.10		Citizenship Education, Sustainability and Environment Education							2		2	
6.1	6. School Experience	Pre-Internship Practice (Demonstration lessons, Peer teaching)					2				2	20
6.2		School Observation						2			2	
6.3		School-Based Research Project								2	2	
6.4		Internship in Teaching							10		10	
6.5		Post- Internship (Review and Analysis)								2	2	
6.6		Creating Teaching Learning Material/ Work Experience (Educational Toy Making, local/Traditional Vocations etc.)							2		2	
7.1	7. Community Engagement and Service	Community Engagement and Service (participation in NSS- related activities, New India Literacy Programme etc.)								2	2	2
8.1	8. Research Project/ Dissertation	Research Project/ Dissertation -I							--			--
8.2		Research Project/ Dissertation -II								--		
		Total	22	22	22	22	22	22	22	22	176	

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F.2.1 Evolution of Indian Education

CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course Title & Code	Credits	Credit Distribution of the Course			Eligibility Criteria	Pre-requisite
		Lecture	Tutorial	Practical/Practice		
Evolution of Indian Education **F.2.1**	4	3	1	-	Class XII	Nil

2.1.1 About the Course and Learning Objectives

The course seeks to develop an understanding among student teachers of the evolution of educationin India that would allow student teachers to locate themselves within the larger system of education. The course aims at orienting student teachers to the historical perspective of Indian education including the development and features of education in ancient India such as the Gurukuls, the post-Vedic period, during Mauryan and Gupta empires, during the colonial era and post-independence period, and the future perspectives about the education development in India, and progression from Education 1.0 to Education 4.0, etc. This course also provides an overview of thecontribution of Indian thinkers to evolve the Indian Education system – Savitribai and Jyotiba Phule,Rabindranath Tagore, Swami Vivekananda, Mahatma Gandhi, Sri Aurobindo, Gijubhai Badheka, Pt. Madanmohan Malaviya, Jiddu Krishnamurti, Dr. Bhima Rao Ambedkar and others.

2.1.2 Learning Outcomes

After completion of this course, it is expected that the student teachers will be able to:

1. discuss and understand the genesis, vision and evolution of education in India from ancient to contemporary times.
2. critically revisit colonial education and it impact on the contemporary Indian education system.
3. enable them to shape their educational perspective to act as an effective teacher.
4. locate themselves in the larger system of education in India while discussing the contribution of Indian thinkers
5. develop a road map for futuristic education system in India for addressing the need of local and global context.

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UNIT – I: Ancient Indian Education: Vedic Period (2 Weeks)

A. Vision, Objectives, and Salient Features of the Vedic Education System.
B. Teaching and Learning Process during Vedic Period
C. Forms and Development of Educational Institutions and Organizational Practices.
D. Understanding Guru Shishya Parampara

UNIT-II: Ancient Indian Education: Buddhist and Jain Period (2 Weeks)

A. Buddhist and Jain Education System: Vision, Objective and Salient Features
B. Teaching -Learning and Curricular Practices during the Buddhist, Jain and Sangam Periods
C. Finance and Management of Educational Institutions.
D. Contribution of Educational Institutions: Nalanda, Taxila, Vikramshila, Vallabhi.

UNIT – III: Post-Gupta Period to Colonial Period (2 Weeks)

A. Brief Historical Development and Salient Features of Education in this Era
B. Educational Systems: Nadia, Home-Education, Pathshalas, Tols, Maktab, Chatuspadis and Gurukuls etc.
C. Pedagogical Inquiry, Community and Its Interface.
D. Finance and Management: Critical Analysis of the Role of Dynasties with reference to Educational Institutions.

UNIT IV: Modern Indian Education (9 Weeks)

A. Colonial Education in India:

   Critical Examination of Wood's Dispatch and Macaulay Minutes; Colonization of Education in India.

B. Swadeshi and Nationalist attempts at Educational Reforms and Contribution of Indian Thinkers (with reference to Objectives of Education, Curriculum and Pedagogy):

   Savitribai and Jyotiba Phule, Swami Vivekananda, Pt. Madanmohan Malaviya, Sir Syed Ahmad Khan, Rabindranath Tagore, Mahatma Gandhi, Sri Aurobindo, Gijubhai Badheka, Jiddu Krishnamurti and Dr. Bhim Rao Ambedkar

C. Education in Independent India
   - Constitutional Values and Educational Provisions.
   - Educational Committees, Commissions and Policies with specific reference to the Kothari Commission, National Policy on Education 1968; National Policy on Education 1986 and its Plan of Action 1992.
   - Educational Planning and Organisation
     Critical review and impact of DPEP, SSA UEE, RMSA, RTE Act 2009.
   - NEP 2020: Futuristic Vision for Education in India

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2.1.3 Practicum

Following are the suggestive practicals and activities. The teachers may design more tasks based on classroom interactions and discussions.

- Prepare a report highlighting the significance of educational reforms in School education in the light of NEP 2020.
- Critically analyze the role of education in understanding the concept of citizenship for democracy.
- Compare the vision, objectives, and salient features of education during different periods.
- Design a plan of action to develop awareness/attitude/practices related to Fundamental Rights/Fundamental duties/Democratic Citizenship.
- Sharing of student experiences (in groups) related to establishing Indian constitutional values through School Education and the need for dynamic and vibrant School Ethos.
- Survey of strengths and limitations of educational institutions of one's own locality.
- Visit to places of educational significance.
- Design activities for developing awareness, attitudes, skills, and participatory values to negotiate diversity in the classroom.

2.1.4 Mode of Transaction

The course content transaction will include the following:

- Planned lectures infused with multimedia /PowerPoint presentations.
- Small group discussion, panel interactions, small theme-based seminars, group discussions, cooperative teaching and team teaching, selections from theoretical readings, case studies, analyses of educational statistics and personal field engagement with educationally marginalized communities and groups, through focus group discussions,surveys, short-term project work, etc.
- Hands-on experience of engaging with diverse communities, children, and schools.

2.1.5 Mode of Assessment

The examination scheme and mode shall be as prescribed by the Examination Branch, University of Delhi, from time to time.

2.1.6 Suggestive Reading Materials

Teachers may suggest books/readings as per the needs of the learners and learning content.

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F.2.2 Sociological Perspectives of Education

CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course Title & Code	Credits	Credit Distribution of the Course			Eligibility Criteria	Pre-requisite
		Lecture	Tutorial	Practical/Practice		
Sociological Perspectives of Education **F.2.2**	4	3	1	-	Class XII	Nil

2.2.1 About the Course and Learning Objectives

Sociological Perspectives of Education seek to encourage students to explore the relationship between social structures and educational provision. The course focuses on the study of the social behaviour of individuals, groups, and societies. It provides opportunities for student teachers to examine relationships among individuals, as well as relationships between people and their societies.

2.2.2 Learning Outcomes

After completion of this course, it is expected that the student teachers will be able to:

- recognize the social context of education while outlining the meaning, nature, and scope of educational sociology
- explain the process of socialization and its relation with education.
- analyze the role of education in the process of social change
- analyze the impact of culture on education through a study of dimensions of culture and their importance to educational practices,
- analyze the provisions of the constitution in promoting equity via education.
- identify the relationship between education, modernization and social change

UNIT – I: Education and Society (3 Weeks)

A. Sociological Reflections on the Relationship of Society and Education (role, status, institution, systems and practices)
B. Conceptual Understanding of Ideology, Social System, Social Values, Norms, Conflict and Modernization
C. Educational Sociology and Education as a Social System/Institution
D. Process of Socialization with reference to the role of Various Institutions
E. Social Positionality of Individual and the Role of Education

UNIT – II: Education and Social Change (4 Weeks)

A. Meaning and Dimensions of Social Change.

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B. Factors affecting Education and Social Change: Technology, Market, Social and Educational Movements, Curricular Innovations, Value Conflict, and Legal Provisions.
C. Inequalities (Gender, Race, Colour, Class, Geo-political, Geo-spatial, Caste, Disability etc.) and Asymmetries with interface of Family, School and Community
D. Constitution of India, Education and Social Empowerment (Social Equality and Equity)
E. Modernity, Education and Social Change

UNIT – III: Education, Culture and Socialization (4 Weeks)

A. Schooling in India: Intersection of Education, Culture and Community
B. Education as a Process of Socialization.
C. Role of the following on Culture and Educational Process: Social Welfare, Social Reform Movements, Legal interventions on Child Marriage and Child Labor Act, Educational Policies and Acts, Adult Literacy, New Technologies of Communication and Equality.
D. Researching Culture and Education: A Cross-Cultural Analysis

UNIT – IV: Education and Values (4 Weeks)

A. Concept and Types of Values
B. Understanding the Relationship between Education and Values
C. Constitutional Values and its Impact on Education.
D. Human Rights Perspective/Approaches, Education and Values.
E. Sociology's Response to Environmental Issues through Education
F. Pedagogical Concerns in Promoting Values through Education

2.2.3 Practicum

1. Critical/Reflective study of contemporary aims of education and their social determinants.
2. Observation and critical study on how textbooks determine every activity of teacher and learner in the school.
3. A critique of textbook culture in school.
4. Observing the process of knowledge construction by children in structured and unstructured environments to appreciate their learning processes and nature.
5. A critical analysis of Constitution of India in the context of process of Education in India / Educational Policies / Educational Commissions)
6. Critically observing nearby society/ locality in groups of 4-5 students and sharing observations related to cultural/ social influences on educational practices.
7. Analyzing social purpose of NEP, 2020.

2.2.4 Mode of Transaction

The course content transaction will include the following:

- Planned lectures infused with multimedia /PowerPoint presentations.
- Small group discussion, panel interactions, small theme-based seminars, group discussions, cooperative teaching and team teaching, selections from theoretical readings, case studies, analyses of educational statistics and personal field engagement with educationally marginalized communities and groups, through focus group discussion, surveys, short term project work etc.

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- Hands-on experience of engaging with diverse communities, children and schools.

2.2.5 Mode of Assessment

The examination scheme and mode shall be as prescribed by the Examination Branch, University of Delhi, from time to time.

2.2.6 Suggestive Reading Materials

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- Bell, M. Mayerfeld (2004). *An invitation to environmental sociology.* Pine Forge Press.
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- Weber, M. (1949). *The methodology of the social sciences (1st ed.)*. The free press of Glencoe
- Weber, M. (2011). The rationalization of education and training. In A. Richard., I. R. Beattie & K. Ford, (Eds). *The structure of schooling: Readings in the sociology of education* (3rd ed.). Sage Publication. ISBN 978-1-4522-0542-7.

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AE & VAC: 5.1: Language - I (As per the 8th Schedule of the Constitution of India)

CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course Title & Code	Credits	Credit Distribution of the Course			Eligibility Criteria	Pre-requisite
		Lecture	Tutorial	Practical/Practice		
Language - I (As per the 8th Schedule of the Constitution of India) **AE & VAC: 5.1**	4	-	-	4	Class XII	Nil

5.1.1 About the Course and Learning Objectives

Language has undeniable links with all kinds of learning. Language enables an individual to understand new concepts, exchange ideas and communicate thoughts with fellow beings. To fully appreciate the role of language in education, one must develop a holistic perspective on language. Language needs to be examined in a multi-dimensional space, giving importance to its structural, literary, sociological, cultural, psychological, and aesthetic aspects. The National Education Policy 2020 envisages imparting language skills as part of holistic education. It lays thrust on the need to enhance language skills for better cognitive development and the development of a holistic personality of the learners.

This course aims to enable student-teachers to enhance their ability to effectively listen, speak, read, write, and demonstrate language skills. Language skills are fundamental to constructing knowledge in all academic disciplines, participating effectively in work and creating sense in everyday life. Through this course, the students will be able to enhance proficiency in reading with comprehension, understanding, thinking, and conceptualizing. The course seeks to enhance student-teachers' critical thinking abilities and effective communication skills. The course involves hands-on activities and practical sessions that help student-teachers develop and use language skills in various situations.

5.1.2 Learning Outcomes

After completing the course, it is expected that the student-teachers will be able to:

- define language and its functions in various contexts;

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- discuss the various constitutional perspectives on languages;
- recognize the link between language and cognition and using linguistic knowledge and skills for effective communication of ideas and thoughts;
- demonstrate knowledge and capacity for effective listening, speaking, reading, writing and critical thinking;
- build interpersonal relationships and enhance social skills

UNIT – I: Language, Communication and Cognition (3 Weeks)

A. Language: Definition, Characteristics, Functions; Language as a means of Communication and Language as a Medium of Cognition

B. Language, Culture and Society: Language Variation, Language versus Dialect, Constitutional Perspective of Languages; Language Policy and Language Planning, Language Standardization; Bi-/Multilingualism in India

C. Nature and Process of Communication: Principles, Types of Communication (Formal and Informal, Written and Oral, Verbal and Non-Verbal), Barriers to Communication, Features of Effective Communication, The Context of Communication, The Role of Decoder, Face-to-Face Interaction, Turn-Taking, Conversation, New-Age Technologies

UNIT – II: Understanding Language, Components and Functions (3 Weeks)

A. Classification of Speech Sounds and Letters, Parts of Speech, Production of Speech Sounds in Languages; Suprasegmentals: Stress, Pitch, Tone, Intonation, Juncture, Graph Phonemic Awareness

B. Identification of Morphemes, Word Formation Processes, Lexical, Vocabulary Formation, Coining New Words, Speech Acts

C Syntax-Types of Sentences- Simple, Complex, And Compound

D. Semantics and Pragmatics

UNIT – III: Listening and Speaking Skills (3 Weeks)

A. Listening and Hearing; Subskills of Listening, Good Listening Behaviour; Listening Strategies.

B. Listening Comprehensions: Listening Across the Curriculum, Recorded Speeches/Texts; Understanding of Various Accents, Note Taking

C. Speaking to Learn And Learning To Speak; Impact of Culture on Speaking; Practicing Narrative Skills; Body Language, Voice, and Pronunciation; Creating Interest and Establishing a Relationship with the Audience.

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D. Task/Activities for Developing Speaking Skills- Situational Conversations and Role Plays; Speech, Elocution, Discussion, Debate, Storytelling, Illustrations

UNIT – IV: Reading Skills (3 Weeks)

A. Reading Comprehension, Types of Reading, Meaning and Context, Reading as an Interactive Process; Strategies for Making Students Active Readers and Developing Critical Reading Skills;

B. Understanding Denotative and Connotative Aspects of a Text, Vocabulary Development Through Reading, Reading Discipline-Based Texts, and Features that Make Texts Complex.

C. Enhancing Critical Thinking Abilities; Critical Interpretation. Questioning and Challenging your Beliefs and Values; Developing Ideas and Evaluating an Argument.

D. Observing, Describing and Framing the Problem; Comparing and Evaluating a Problem.

UNIT – V: Writing Skills (3 Weeks)

A. Speech Versus Writing; Types of Writing; Writing for Specific Purposes (Essays, Letters, and Reports, Etc.).

B. Language and Style of Writing: Dealing with New Words (Academic Vocabulary Building), Summarizing and Paraphrasing Techniques.

C. Academic Writing Components; Development of Academic Language; Activities to Develop Academic Writing Skills.

D. Developing Critical, Analytical, and Interpretive Thinking Skills.

5.1.3 Practicum

Following are the suggestive practicals and activities. The teachers may design more tasks based on classroom interactions and discussions.

1. How do you interpret every day and reflect upon what you read? Prepare a report.
2. Analyze a recorded video from the perspective of voice and pronunciation and write a report.
3. Observing, describing and framing a problem and evaluating it.
4. Perform role play in different conversational contexts.
5. Listen to recorded audio on any topic of your interest and note the relevant points (note-taking).

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5.1.4 Mode of Transaction

The entire syllabus is based on practical exercises. Teaching this course will involve a combination of interactive sessions and practicals involving discussion, role plays, projects, simulations, workshops, and language-awareness activities. The course intends deeper approaches to learning, such as classroom discussions, critical thinking, problem-solving abilities, and verbal/non-verbal effective communication among the learners. It also focuses on daily life situations where one would perform tasks involving a natural integration of language skills. The course requires the active participation of students. The students are expected to read the assigned chapters/articles before the session.

5.1.5 Mode of Assessment

The assessment of the learner will be primarily based on the assessment of both linguistic and communicative skills using a range of activities, group work and projects.

The examination scheme and mode shall modify and/or evolve as per the guidelines of the examination Branch, University of Delhi, from time to time.

Assessment Component	Total Marks
Cumulative Assessment (CA)	40
End-Term Project/ Activity Bank	80
Viva-Voce	40
Total	160

5.1.6 Suggestive Reading Materials

- पाण्डेय, ल. (संपादक) (2008). *पढ़ना सिखाने की शुरुआत.* राष्ट्रीय शैक्षिक अनुसंधान और प्रशिक्षण परिषद्.
- पाण्डेय, ल. (संपादक) (2008). *पढ़ने की समझ.* राष्ट्रीय शैक्षिक अनुसंधान और प्रशिक्षण परिषद्.
- पाण्डेय, ल. (संपादक) (2009). *पढ़ने की दहलीज़ पर.* राष्ट्रीय शैक्षिक अनुसंधान और प्रशिक्षण परिषद्.
- बोरा, रा. (1993). *ऐतिहासिक भाषा विज्ञान.* हिंदी माध्यम कार्यान्वयन, दिल्ली विश्वविद्यालय.
- मीमांसक, यु. (1963) *संस्कृत व्याकरण शास्त्र का इतिहास,* भारतीय प्राच्य विद्या प्रतिष्ठान.
- शिक्षा एवं समाज कल्याण मंत्रालय. (2018), भाषा शिक्षण हिंदी | भाग-1 ,राष्ट्रीय शैक्षिक अनुसंधान और प्रशिक्षण परिषद्. ISBN 978-93-5292-018-1
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- Agnihotri, R. K. (1996). Kaun bhasha kaun boli. *Sandarbh* 13, 37-43.
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- Kaushik, S. (Editor) (2009). *Reading for Meaning*, NCERT.
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5.1.7 ADDITIONAL READINGS

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- Kumar, K. (2004). The Child's Language and the Teacher : A Handbook. National Book Trust. Delhi.
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- National Curriculum Framework for Foundational Stage 2022, NCERT. New Delhi
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AE & VAC: 5.2: Language - 2 (Other than L1)

CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course Title & Code	Credits	Credit Distribution of the Course			Eligibility Criteria	Pre-requisite
		Lecture	Tutorial	Practical/Practice		
Language - 2 (Other than L1) **AE & VAC: 5.2**	4	-	-	4	Class XII	Nil

5.2.1 About the Course and Learning Objectives

The course aims to prepare the students for the sound systems of languages, word formation processes, sentence formation, semantic and pragmatic aspects of languages. The course intends to enable the learners to integrate all four language skills using different genres. The major aim of this course is to empower the learners to contribute to the discourses on various issues and themes. The course also orients the students to the use of different technology and digital media for developing their own communicative skills as well as the school students they would teach in the future. The course helps improve basic communication skills such as listening, speaking, reading, and writing skills among L2 language learners. The course is designed to enhance knowledge of the grammar of L2 and enable the students to formulate grammatically correct and contextually appropriate sentences and words and empower the students with summarizing skills, and oral presentation skills effectively. The course also seeks to enhance students' critical thinking capacities, demonstrate effective communication skills and provide hands-on activities to student teachers to develop their language skills through practical sessions.

5.2.2 Learning Outcomes

After completing the course, it is expected that the student teachers will be able to:

- define the needs and importance of multilingualism, the relationship between multilingualism and scholastic achievement.
- demonstrate reading, writing, listening, speaking, and critical thinking abilities in L2.
- recognize the link between language and cognitive skills and apply their knowledge

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and skills effectively for all purposes.

- build interpersonal relationships and enhance social skills.

UNIT – I: Language, Society, and Learning (4 Weeks)

A. Bi-/Multilingualism: Conceptual Understanding and Scholastic Achievements; Language Variation and Social Variation; Languages Versus Dialects, Cultural Transmission of Language, Language and Gender; Language and Identity; Language and Power; Constitutional Provisions and National Education Policy 2020.

B. Language Acquisition and Language Learning; Language Learning from Mother Tongues to Other Tongues; Advantages of Learning other Languages; Language and Education; Notion of First Language, Second Language and Others.

UNIT – II: Understanding Grammar (4 Weeks)

A. Arbitrariness in Language; Classification Sessions of Speech Sounds: Vowels, Consonants, and Others; Suprasegmental: Stress, Pitch, Tone, Intonation, and Juncture; Acoustic Phonetics.

A. Word and Meaning; Parts of Speech, Grammatical Categories; Word Formation: Affixation, Compounding, Reduplication, Vocabulary Building.

B. Sentence and its Constituents: Simple, Complex, and Compound Sentences; Semantics and Pragmatics: Lexical Meaning- Synonymy, Antonymy, Meronymy, Grammatical Meaning, Speech Acts.

UNIT – III: Basic Communication Skills in L2 (4 Weeks)

A. Pronunciation and Listening Comprehension Skills.

B. Reading and Reading Comprehension Skills.

C. Writing Systems: Speech and Writing; Types of Writing Systems.

D. Effective Writing Skills; Effective Presentation and Speaking Skills; Summarizing and Paraphrasing Skills.

UNIT – IV: Critical Reading and Thinking Skills (3 Weeks)

A. Components of Critical Thinking and Reading; High Order Cognitive Development; Critical Thinking and Problem-Solving; Rational Inquiry.

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5.2.3 Practicum

Following are the suggestive practicals and activities. The teachers may design more tasks based on classroom interactions and discussions.

1. Listen to a recorded speech and classify it based on sounds: vowels, consonants, and others; suprasegmental: stress, pitch, tone, intonation, and juncture; Acoustic phonetics.
2. Compare and analyze the language structure of L1 and L2 in any context (sound, morpheme, semantics and syntax, etc.)
3. Analyze sentences and their constituents as simple, complex, and compound sentences from written work.

5.2.4 Mode of Transaction

The entire syllabus is based on practical exercises. Teaching this course will involve a combination of interactive sessions and practicals involving discussion, role plays, projects, simulations, workshops, and language-awareness activities.

The course intends deeper approaches to learning, such as classroom discussions, critical thinking, problem-solving abilities, and verbal/non-verbal effective communication among the learners. It also focuses on daily life situations where one would perform tasks involving a natural integration of language skills. The course requires the active participation of students. The students are expected to read the assigned chapters/articles before the session.

5.2.2 Mode of Assessment

The assessment of the learner will be primarily based on the assessment of both linguistic and communicative skills using a battery of tests and test types, group work and projects.

The examination scheme and mode shall modify and/or evolve as per the guidelines of the Examination Branch, University of Delhi, from time to time.

Assessment Component	Total Marks
Cumulative Assessment (CA)	40
End-Term Project/ Activity Bank	80
Viva-Voce	40
Total	160

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5.2.6 Suggestive Reading Materials

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AE &VAC: 5.3 : Arts (Performing and Visual) and Creative Expressions

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Course Title & Code	Credits	Credit Distribution of the Course			Eligibility Criteria	Pre-requisite
		Lecture	Tutorial	Practical/Practice		
Arts (Performing and Visual) and Creative Expressions **AE &VAC: 5.3**	2	-	-	2	Class XII	Nil

Option 1 - Collage-Making

5.3.1 About the Course and Learning Objectives

Engagement with various forms of art as self-expression and the need to develop sensibility to appreciate them has been an important concern in educational theory and practice. This concern is premised on the claim that forms of self-expression contribute immensely to the development of cognitive, affective and psycho-motor dimensions among children, as well as that through one or another art form, children come to explore ways of expressing themselves. Further, it is also the case that critical appreciation of art enables children to form judgments of a very special kind, namely, aesthetic judgment. This enables students as they grow into adults to have focused attention on making sense of and appreciating cultural productions.

Children enjoy artwork a lot. They explore and find meaning in artwork. Their psycho-motor skills get developed through art. The huge element of socialization is acquired through different forms of art. They get to know each other and understand each other and make friends through art. They develop their peer group through getting involved in art forms. Learning to work with others is also achieved through art. It gives them space to think independently, create and reflect. It is one space where all the three are involved- hand, head, and heart.

Therefore, educational practitioners that the students aim to be, will need to bring an element of art in practices that they engage in. To be able to do this, they need an appreciation of art in general, familiarity with one art form, and basic skills and capabilities to be creative and artful. Additionally, they should be familiar with some critical debates in art education, even if their work is in other subject areas.

To this end, students will do one course that aims to help them recognize and appreciate the *importance of aesthetic judgment, develop familiarity with an art form* and basic skills to be *creative and artful in their expressions*. Skills develop from practice, therefore hands-on training in doing art will be emphasized in this course. This course aims to help students

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develop a habit of performing skillful activities that are essentially aesthetic and artful which is expected to contribute to other educational practices that they develop in other courses in the programme.

Therefore, this course will explicitly relate this skill to activities that practitioners of education engage in, like teaching, development of teaching-learning material, and content of other subject areas wherever possible.

Collage as Visual Art Medium

A major aspect of collage, and one that is sometimes overlooked, is the incredibly diverse array of materials and objects that can be used. Collecting interesting materials is an ongoing activity for artists and for those who teach collage. But it is just as important for young people to hunt for and make decisions about materials they would like to incorporate into their work. All materials, and the alterations that artists make to them, are suggestive of ideas and concepts based on their surfaces, forms, textures, degree of transparency and opacity, color, and other visual characteristics. Materials also connect us, through association and reference, to social and cultural worlds and places. What ideas might a scrap of newspaper, as a collage material, express? How might these meanings differ from those of, say, feathers? Or twigs? Or a thin piece of plastic cut out from a plastic bag?
Working with and creating artwork in Collage involves various aspects: selecting materials, manipulating materials, investigating materiality, closely observing materials, discovering possibilities, composing, designing the artwork, planning, finding solutions, applying solutions, thinking flexibility, decision-making, researching, using imagination, expressing, taking creative risks, develop perseverance, and much more. Students will also be introduced to various aspects of art in education: The value of art and artmaking by itself, art's use as an instrument in education, social and moral dimensions of art, and the controversial perceptions around good art and bad art.
This course aims for students to understand the importance of aesthetics and art in education, the role art can play in education, and mainly to appreciate, understand and gain skills with the medium of collage and its techniques.

5.3.2 Learning Outcomes

After completion of this course, it is expected that the students will be able to:

- articulate the importance and the role of aesthetics and art in education;
- understand the medium of collage and its versatility;
- design, plan, and create an expressive self-portrait collage by applying a variety of collage techniques;
- design and set up an interactive visual art exhibition to display their artworks;
- understand and appreciate art-based learning experiences;
- develop the ability to reflect and challenge their assumptions and beliefs around art and develop new understandings.

UNIT – I: Understand the Importance of Aesthetics and Art in Education (1 Week)

Students will collectively view and engage in a series of artworks closely, share their observations, critically analyze their observations, listen to multiple perspectives from peers, suspend judgements, and draw their own understanding of the artwork. They will gain familiarity with the role of art in education and will recognize aesthetic experiences through compare and contrast.

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A. Introduction to Art and Aesthetics.
B. Visual Thinking Strategy (VTS) Activity.
C. Learning Art Forms (Warli, Madhubani, Gond Art and Others) – Any One.
D. Art as Self–Expression and its Application in Education.

UNIT-II: Exploring paper collage and its techniques (2 Weeks)

Students will view and discuss examples of collage artworks; artist process and artist interview videos Students will get a chance to compare and contrast various ways collage as a medium is used and will engage in discussions and dialogues. Students will analyze effective ways of using the medium of collage in educational and other settings.

A. Introduction to Collage and its Medium (Newspaper, Fabric, Ribbon, Coins, Feathers and others).
B. Manipulating Paper in Different Ways and Creating 2-D Composition of Paper Collage.
C. Creating Visual Texture, Physical Texture and Patterns Using Techniques Like (Decoupage, Photomontage, And 3 -D).

UNIT – III: Ideating and creating for an Expressive Self-Portrait (7 Weeks)

Students will engage in art making activities. Students will draw from their previous experiences of using paper for 2D explorations and add more interest to their unique 3D explorations. Students will continuously reflect on their learning through artwork. Students will work independently and collaboratively throughout the course.

A. Making Paper Stand and Create Paper Sculpture Using 3 -D Techniques (Like Paper – Cutting, Paper Folding, Clay, Paper- Mache).
B. Engaging in Close Observation Sketching and Drawing Activity (Self- Portrait, Poster, Calligraphy).
C. Expressive Self- Portrait Drawing and Collage

UNIT – IV: Designing and setting up an Exhibition (5 Weeks)

Designing, Planning and Setting Up an Art Exhibition.

5.3.3 Pedagogy

Students will be planning the various aspects of a visual art exhibition: ways to display artworks, designing the layout of the exhibition space and how the audience will move within the space. Students will divide the tasks among themselves and set up the exhibition space.

5.3.4 Mode of Transaction

The entire syllabus is based on practical exercises. The nature and scope of activities and tasks are explained in each unit.

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5.3.5 Mode of Assessment

The examination scheme and mode shall modify and/or evolve as per the guidelines of the Examination Branch, University of Delhi, from time to time.

S. No.	Assessment Task	Marks	Total Marks
CA	Appreciation and creation of any one artwork. Painting (A-3 or A-4 size) (on paper or cloth)	**5**	**20**
	Creation of any two-collage work using different medium and techniques (at least one paper collage)	**15**	
End-Term Project/Practical	• Creation of paper sculpture compositions using 3D technique. • Creation of self-portrait/calligraphy/poster. • Creation of an artwork on self-portrait collage. • Designing and setting up of an exhibition	**40**	**40**
Viva-Voce		**20**	**20**
Total		**80**	

5.3.6 References

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5.3.7 Resources

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- Planning templates for exhibition.
- Handouts out on Collage techniques and artist examples Works of Deborah Roberts, William Kentridge, Wangechi Mutu, etc.

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Arts (Performing and Visual) and Creative Expressions **AE &VAC: 5.3**	2	-	-	2	Class XII	Nil

Option 2 – Theatre in Education

5.3.1 About the Course and Learning Objectives

The engagement with various forms of art as self-expression and the need to develop a sensibility to appreciate them has been an important concern in educational theory and practice. This concern is premised on the claim that forms of self-expression contribute immensely to the development of cognitive, affective, and psycho-motor dimensions among children, as well as that through one or another art form the children come to explore ways of expressing themselves. Further, it is also the case that critical appreciation of art enables children to form judgments of a very special kind, namely, an aesthetic judgment. This enables students as they grow into adults to have focused attention on making meaning of what surrounds them and appreciating cultural productions.

Children are naturally tuned to appreciate art, as it activates their senses. Further, their psycho-motor skills are developed through art. It gives them space to think independently, create and reflect while working with others. It is a unique space where all three are involved- hand, head and heart.

Therefore, students who aim to be educational practitioners will need to bring an element of art to the educational practices that they engage in. To be able to do this, they need an appreciation of art in general, familiarity with one art form, and basic skills and capabilities to be creative and artful.

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To this end, in the first semester, students will attend one course that aims to help them recognize and appreciate the importance of aesthetic judgment, develop familiarity with an art form and basic skills to be creative in their expressions. Skills develop from practice, therefore hands-on training in doing art will be emphasized in this course. This course aims to help students develop a habit of improvising on theatrical performances that include following aesthetic judgement at all stages, which will contribute to other educational practices that they develop in the larger programme. Therefore, this course will explicitly relate this skill to activities that practitioners of education engage in, like teaching, developing teaching-learning material, and producing content of other subject areas wherever possible.

Theatre and Drama in Education

Theatre is a collaborative art form, and it is inherently interdisciplinary in its nature. It comprises many facets and skills like acting, directing, writing, designing the sets and costumes, make-up, production, lights, sounds and music. All these elements and skill sets come together and are stitched in the form of a 'play' which is performed live, in front of an audience. In the Indian context, theatre has a deep-rooted history with its classical, folk, and other cultural forms until other contemporary forms of theatre evolved in recent times.

Theatre education for children can play a vital role in their individual, social, and emotional development. It teaches them the values of trust and interdependence, makes them confident to express themselves and helps them learn to work in a collaborative environment. It develops their ability to contextualise, critique and discuss certain questions and thoughts they encounter in everyday life. It further helps them imagine, explore, and create their own narratives.

In this course, we will briefly talk about the aesthetics of theatre and how theatre exists in different forms. The students will learn some basic theatre tools that will help them create and perform a narrative they collaboratively arrive at.

In simple terms one can say theatre has two major aspects i.e., creating the script and then performing it. Body is the primary instrument in any theatrical performance accompanied by text, material, visual and sound. This course will introduce students to these aspects of any theatre performance, in the form of direct experience by doing this themselves.

5.3.2 Learning Outcomes

After completion of this course, it is expected that the students will be able to:

- develop and foster the aesthetic sense and temperament in life;
- articulate the importance of aesthetics and art in education;
- demonstrate their familiarity with and appreciation of theatre and drama;

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- demonstrate basic theatre tools of improvisation, ideation, and the process of creating the thematic presentation;
- explain different theatrical pedagogies;
- create a short performance with educational possibilities;
- design a framework for the integration of theatre and drama in their respective subjects.

UNIT – I: Importance of Aesthetics and Art Education (1 Week)

In this unit, we will discuss examples of how theatre was used in social movements that have contributed to educating the larger population about important social issues. Exposing students to these approaches will lead to rich discussions on the role of theatre in pedagogy and practice.

Students will learn from the practices and approaches of theatre groups like Budhan Theatre which works with denotified tribes, and Manalmagudi which works closely with physical and nonverbal theatre and Jana Sanskriti Centre for Theatre established in 1985.

- The Value of Art Itself and its Use in Education.
- Identifying and Developing Aesthetic Sense Using Examples of Theatre/Drama.
- Introduction to Theatre in Education and Drama in Education.
- Use of Theatre/Drama in Social Movements.

UNIT – II: Introduction to Theatre, and Beginning with the Body (2 Weeks)

There will be several games, exercises, and drama conventions that will familiarize them with certain basics of movement, voice, and acting and thereby create improvisations and images in a given context to increase teachers' own self-awareness, awareness of the classroom environment and sensitivity towards the learner which helps them to break the stereotypical image of conventional teacher and converting into a progressive facilitator.

- Principles and Awareness on How to Use Body and Voice in a Given Space and Time.
- Exploring Different Roles, Characters, and Relationships to Identify and Portray Human Values, Attitudes, Intentions and Actions in Different Situations and Contexts.

UNIT – III: Arriving at a Script (4 Weeks)

Students will learn from everyday experiences of memory, sound and visuals, without a written text or spoken word. They will use the skills of improvisation they learned in Unit 2 to explore, ideate, create, and finally arrive at a script. Students will be encouraged to use their perspectives on themes around the education system or curricular areas, in converting the text into a script.

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Creating the connection between the text and the learner (emotional and experiential) they need to understand different theatrical pedagogies as mentioned above which they can use directly in their classroom environment at the same time they have to explore and create sessions around suggested pedagogical tools to enquire and understand their curricular themes.

- Introduction to Different Games, Exercises and Conventions of Theatre and Drama.
- Building Skills for Script Development and Adapting/Devising a Script aound Curricular Themes.
- Understanding Different Theatrical Pedagogies Such as Process Drama, Curriculum Drama, Mantle of Expert, Teacher in Role Etc.

UNIT – IV: Developing and Performing the Script (8 Weeks)

This unit enables them to use drama methods such as mantle of expert, process drama, Teacher in role and curriculum drama etc. and it facilitates their understanding of creating lesson plans for their respective subjects. The students will develop and design a session of learning content as a module which will be based on the process of drama and theatre technique.

Those who would choose to create a Theatre script based on their subject or interdisciplinary areas will engage in the making of a play. Apart from using their bodies to play characters, the students will also have to think about design and other aesthetic elements like sets, props, costumes, lights, music and sounds they want to use in the performance. Students will present the final text on stage.

- Developing and Designing Lesson Plans Using Drama Pedagogies for Their Respective Subjects and Developing and Designing Theatre Scripts on Their Respective Subjects or Interdisciplinary Areas.

- Creating a Session of Learning Content as a Module which will be based on the Process of Drama and Theatre Technique.

- Presentation of Drama Lesson Plans (Drama Programme), Reflection and Addressing Challenges and Possibilities

5.3.3 Pedagogy

Each unit has an overview of the classroom processes involved therein. Overall it is recommended that the pedagogy will be basically hands-on training. More emphasis is given to experiential learning. The students will learn through experience and by doing, they learn about theatre/ drama and its connection to education. The process takes them through different forms of theatre /drama methodologies like the mantle of expert, process drama, Teacher in role and curriculum drama etc,

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Storytelling (different Folklore), Folk theatre (Kathakali, Chhau, Bhavai, Yakshagaana, Jatra and Nautanki etc)

5.3.4 Suggestive Mode of Assessment

Assessment Tasks		
	Task	**Marks**
Cumulative Assessment **CA**	Critical Review of theatre forms/ theatre literature	**5**
	Demonstration of theatrical pieces based on their movement and speech./ verbal and non-verbal performance	**15**
End-Term Project/Practical	• Group improvisation based on any theme/content • Planning of their Script and Performance.	**40**
Viva-Voce		**20**
Total		**80**

5.3.5 Suggestive Reading Materials

- Anderson, M. (2012). *A Master Class & Drama Education: Transforming Teaching and Learning*. Continuum International Publishing group. ISBN: 978-1-4411-6700-2
- Boal, A. (2002). *Games for Actors and Non-actors* (2nd ed.). Routledge. ISBN: 0-203-99481-7
- Farmer, D. (2007). *Drama in 101 Games & Activities* (2nd ed.). Lulu. ISBN: 978-1-84753-841-3
- Goodwin, J. (2006). *Using Drama to Support Literacy* (1st ed.). Sage publication. ISBN-13: 978-1412920506
- Heathcote, D., & Bolton, M. G. (1995). *Drama for Learning* (1st ed.). Heinemann. ISBN -13:978- 0435086435
- Morgan, N., & Saxton, J. (1987). *Teaching Drama: A Mind of Many Wonders. Cheltenham.* Stanley Thornes. ISBN:0748702431
- Satish. (2008). *Rangmanch ek Shekshik Sanstha ke Roop me.* Unpublished thesis(PhD) University of Delhi

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AE &VAC: 5.4.I: Understanding India Part I
(Indian Ethos and Knowledge Systems)

CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course Title & Code	Credits	Credit Distribution of the Course			Eligibility Criteria	Pre-requisite
		Lecture	Tutorial	Practical/Practice		
Understanding India (Indian Ethos and Knowledge Systems) AE &VAC: 5.4.I	2	-	-	2	Class XII	Nil

5.4.1 About the Course and Learning Objectives

At a time when the world finds itself deep in dynamism, led by technological innovations and environmental changes, there is a need for an inward-looking approach to building the young minds of a country. By looking inward, one not only finds a sociological belongingness but also a spiritual and intellectual rooting in these changing times. The course provides an overview of India's heritage and knowledge traditions across key themes of economy, society, polity, law, environment, culture, ethics, science & technology, and philosophy. It places special emphasis onthe application of these knowledge traditions, helping students to not only know and appreciate India's heritage and knowledge traditions but also to independently evaluate them through a multidisciplinary lens. This evaluation would produce valuable lessons for obtaining transferableand 21st-century skills. The course will establish foundational knowledge and build upon it. It will allow students to have a basic understanding of the traditions of India and how it has evolved over the years. The course is designed to enable student teachers to outline and interpret the processes andevents of the formation & evolution of knowledge of India through a multidisciplinary lens; to evaluate the diverse traditions of India to distinguish its achievements and limitations, and to develop and articulate an ethics-based education rooted in Indian thought to their students in the classroom context.

5.4.2 Learning Outcomes

After the completion of the course, it is expected that the students will be able to:

- recognize the vast corpus of knowledge traditions of India, while developing an appreciation for it,
- apply their acquired research and critical thinking skills to multidisciplinary themes, and-appreciate the diverse belief systems and knowledge traditions in India.
- discuss the formation and evolution of knowledge of India through a multidisciplinary lens.

UNIT - I

Introduction to the Knowledge of India (2 Weeks)

A. Definition & Scope; Relevance of this Knowledge.
B. Need to revisit our Ancient Knowledge, Traditions, and Culture.

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UNIT - II

Culture - Art and Literature (4 Weeks)

A. Fine Arts (Traditional Art Forms, Contemporary Arts, Arts and Spirituality, Arts and Identity, and Art and Globalization);
B. Performing Arts (Indian Dance Systems, Traditional Indian Pieces of Music, Visual Arts, Folk Arts, etc.,).
C. Literature (Sanskrit Literature, Religious Literature, Indian Poetry, Folk Literature, Indian Fiction, Sangam Literature, Kannada, Malayalam Literature, Bengali Literature, etc.

UNIT - III

Polity, Law and Economy (5 Weeks)

A. Kingship & Types of Government (Oligarchies, Republics); Local Administration (Village Administration);
B. Basis of Law: Dharma & its sources; Criminal Justice: Police, and Punishments; Lessons from Chanakyaniti; Lessons for modern-day India: Towards a Tradition-Driven Equitable and Just Polity and Law System.
C. Overview of the Indian Economy from the Stone Age to the Guptas: The new culture of Urbanization (including Castes, Guilds, and other Economic Institutions; Harappan Civilization Economy; Growth of Agriculture and Proliferation of New Occupations; Growth of Writing);
D. Internal & External Trade and Commerce, including Trade Routes, Indo-Roman Contacts, and Maritime Trade of South India; Temple Economy.
E. Land Ownership - Land Grants & Property Rights, Land Revenue Systems.
F. Understanding Arthashastra: Ideas & Criticism; Locating Relevance of Ancient Indian Economic Thought in Modern-Day Indian Economy.
G. Understanding Economy, Polity and Law in Contemporary India

UNIT - IV

Environment & Health (4 Weeks)

A. Understanding Equilibrium between Society & Environment: Society's Perceptions of Natural Resources like Forests, Land, Water, and Animals.
B. Sustainable Architecture & Urban Planning; Solving Today's Environmental Challenges (Best Practices from Indigenous Knowledge, Tribes and Community-Led Efforts, etc.).
C. India's Health Tradition: Ayurveda, Siddha, Ashtavaidya, Unani, and other Schools of Thought; Lessons from Sushruta Samhita and Charaka Samhita;
D. Mental health in Ancient India: Towards Time-Tested Concepts of Mental Wellness (Concept of Mind, Dhyana, Mind-Body Relationship, Ayurveda, Yoga Darshan, Atman, etc.)

5.4.3 Practicum

The modes of curriculum transaction will include lectures, Tutorials, and Practicum.

- Practicum will include organization of day trips that help student teachers watch eventsrelating to visual and performing art; activities that enable student teachers to identify and record through photos, videos, etc. the elements of ancient architecture still existingin the city around them; organization of Individual and group presentations based on themes such as Polity, Law and Economy etc., organization of a 'Knowledge of India' day in the institution to celebrate the culture (food, clothes, etc.) that they would have been explored in lectures and

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tutorials; interactions with family members, elders, neighbours, and other members of society about the evolution of local systems and economy etc.

5.4.4 Mode of Transaction

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

5.4.5 Mode of Assessment

The approaches to learning assessment will include:

- Supporting the curiosity and interest of student teachers in the selected themes through a multi-modal approach, including regular assessments and actionable feedback that enablelearners to outline and interpret the processes and events of the formation & evolution of knowledge of India through a multidisciplinary lens.
- Enabling the student teachers to demonstrate critical analysis and independent thinking ofthe processes and events in the formulation & evolution of different traditions that help student teachers evaluate the diverse traditions of India to distinguish its achievements andlimitations.
- Use of first-hand or second-hand experiences that enable student-teachers to develop and articulate an ethics-based education rooted in Indian thought to their students in the classroom context.

The examination scheme and mode shall modify and/or evolve as per the guidelines of the Examination Branch, University of Delhi, from time to time.

Assessment Component	Total Marks
Cumulative Assessment (CA)	20
End-Term Project/ Activity Bank	40
Viva-Voce	20
Total	80

5.4.6 Suggestive Readings Material

Teachers may suggest books/readings as per the needs of the learners and learning content.

- धर्मपाल·) २०१० ·(*भारत की परंपरा,* पुनुर्थान ट्रस्ट·
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- मुख़र्जी, राधा कुमुद) २०२० (*प्राचीन भारत*) १३ वां संस्करण(, राजकमल प्रकाशन·
- योग :स्वस्थ जीने का तरीका) *2018(,* एनसीईआरटी·

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- विद्यालंकार, स·) २०१४ .(*भारतीय संस्कृति का विकास*, श्री सरस्वती सदन, रोहिणी·
- विद्यालंकार, स·) २०१३ .(*प्राचीन भारत का धार्मिक, सामाजिक और आर्थिक जीवन*,
- शर्मा, रा·) २०१५ ·(*भारतीय इतिहास : एक पुनर्विचार* ·हिंदी माध्यम कार्यान्वयन, दिल्ली विश्वविद्यालय
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- सरकार ,सु·) २०१७(· *आधुनिक भारत*. राजकमल प्रकाशन·

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- Dominik, W. (2001). *The roots of ayurveda*. Penguin Classics.
- Mahadevan, B., Bhat, R.V. & Nagendra, P.R.N. (2021). Introduction to Indian knowledge system: Concepts and applications. PHI Learning Pvt. Ltd.
- Nehru, J (1946).*The Discovery of India.* UK:Meridian Books. Reprinted (2008) by Penguin.
- Sinha, A. (1998). Design of settlements in the vaastu shastras. *Journal of Cultural Geography*, 17(2), 27-41.
- Swami Suparnananda (2016). *The Cultural Heritage of India (Vol. 2).* The Rama Krishna Mission Institute of Culture.
- Tachikawa, M. (1971). A sixth-century manual of Indian logic: A translation of the Nyayapravesa. *Journal of Indian Philosophy*, 1(2), 111-145.
- Tripati, S. (2011). Ancient maritime trade of the eastern Indian littoral. *Current Science*, 100(7), 1076-1086.

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AE &VAC: 5.4.II: Understanding India Part II
(Indian Ethos and Knowledge Systems)

CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course Title & Code	Credits	Credit Distribution of the Course			Eligibility Criteria	Pre-requisite
		Lecture	Tutorial	Practical/Practice		
Understanding India (Indian Ethos and Knowledge Systems) AE &VAC: 5.4.II	2	-	-	2	Class XII	Nil

5.4.1 About the Course and Learning Objectives

At a time when the world finds itself deep in dynamism, led by technological innovations and environmental changes, there is a need for an inward-looking approach to building the young minds of a country. By looking inward, one not only finds a sociological belongingness but also a spiritual and intellectual rooting in these changing times. The course provides an overview of India's heritage and knowledge traditions across key themes of economy, society, polity, law, environment, culture, ethics, science & technology, and philosophy. It places special emphasis onthe application of these knowledge traditions, helping students to not only know and appreciate India's heritage and knowledge traditions but also to independently evaluate them through a multidisciplinary lens. This evaluation would produce valuable lessons for obtaining transferableand 21st-century skills. The course will establish foundational knowledge and build upon it. It will allow students to have a basic understanding of the traditions of India and how it has evolved over the years. The course is designed to enable student teachers to outline and interpret the processes andevents of the formation & evolution of knowledge of India through a multidisciplinary lens; to evaluate the diverse traditions of India to distinguish its achievements and limitations, and to develop and articulate an ethics-based education rooted in Indian thought to their students in the classroom context.

5.4.2 Learning Outcomes

After the completion of the course, it is expected that the students will be able to:

- recognize the vast corpus of knowledge traditions of India, while developing an appreciation for it,
- apply their acquired research and critical thinking skills to multidisciplinary themes, and-appreciate the diverse belief systems and knowledge traditions in India.
- discuss the formation and evolution of knowledge of India through a multidisciplinary lens.

UNIT - I
Philosophy, Ethics & Values: Schools of Philosophy (4 Week)

A. Vaishesika, Nyaya, Samkhya, Yoga, Purva Mimansa and Vedanta or Uttara Mimansa (theory and the major thinkers) – and Jain, Buddhist, and Charvak traditions.

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B. Vedanta: Philosophical Systems (Advaita, Vishishtadvaita, Dvaita).
C. Ethics, Morality, and Social Dilemma (including Self-Leadership) and their relevance in today's time.
D. How do Indians value spirituality? Spirituality and Social Responsibility; Importance of Spirituality in current times.
E. Using Ethics in a Technologically Volatile World: leading an ethical and modern life.
F. Practical Vedanta for Well-Being (mindfulness, inter-connectedness, society-self relationship, etc.).

UNIT - II
Culture- Lifestyle (4 Weeks)

A. Food (regional cuisines, Ayurvedic Diet, Food and Festival, Food, Hospitality, and Globalization).
B. Clothes (Traditional Indian Clothing, Textile Arts, Religious Costumes, Clothing Status, Clothing, Gender, Globalization in Clothing).
C. Sports (Traditional Indian Sports, Martial Arts, Sports and Gender, Sports & Globalization).
D. The Lifestyle of Yoga; Adapting Ancient Lifestyle – A path towards longevity.

UNIT - III
Science & Technology (4 Weeks)

A. Arithmetic and logic.
B. Natural Sciences: Mathematics, Physics, Metallurgy, and Chemistry.
C. Astronomy: India's Contributions to the World.
D. Indian Notions of Time and Space.
E. Technology in the Economy: Agriculture, Transportation, etc.

UNIT - IV
Linguistic Traditions (3 Weeks)

A. History of Linguistics in India (Conceptualizing Ancient Indian Linguistics, Oral Traditions, etc.).
B. Language as Culture: Evolution of Languages over the years & Language as Building Blocks to different Cultures and Society
C. Language: Identity, Culture, and History.

5.4.3 Practicum

The modes of curriculum transaction will include lectures, Tutorials, and Practicum.

- Practicum will include organization of day trips that help student teachers watch eventsrelating to visual and performing art; activities that enable student teachers to identify and record through photos, videos, etc. the elements of ancient architecture still existingin the city around them; organization of Individual and group presentations based on themes such as Polity, Law and Economy etc., organization of a 'Knowledge of India' day in the institution to celebrate the culture (food, clothes, etc.) that they would have been explored in lectures and tutorials; interactions with family members, elders, neighbours, and other members of society about the evolution of local systems and economy etc.

5.4.4 Mode of Transaction

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

5.4.5 Mode of Assessment

The approaches to learning assessment will include:

- Supporting the curiosity and interest of student teachers in the selected themes through a multi-modal approach, including regular assessments and actionable feedback that enablelearners to outline and interpret the processes and events of the formation & evolution of knowledge of India through a multidisciplinary lens.
- Enabling the student teachers to demonstrate critical analysis and independent thinking ofthe processes and events in the formulation & evolution of different traditions that help student teachers evaluate the diverse traditions of India to distinguish its achievements andlimitations.
- Use of first-hand or second-hand experiences that enable student-teachers to develop and articulate an ethics-based education rooted in Indian thought to their students in the classroom context.

The examination scheme and mode shall modify and/or evolve as per the guidelines of the Examination Branch, University of Delhi, from time to time.

Assessment Component	Total Marks
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End-Term Project/ Activity Bank	40
Viva-Voce	20
Total	80

5.4.6 Suggestive Readings Material

Teachers may suggest books/readings as per the needs of the learners and learning content.

- उपाध्याय, आ. ब. (1979), *भारतीय दर्शन की रूपरेखा,* चौखंभा ओरिएंटलिया.
- गुप्ता, एस. एन. दास. (2012). *भारतीय दर्शन का इतिहास भाग ३,* राजस्थान हिंदी ग्रन्थ अकादमी.
- गुप्ता, एस. एन. दास. (2012). *भारतीय दर्शन का इतिहास भाग-4 व 5* (तृतीय सं.), राजस्थान हिंदी ग्रन्थ अकादमी.
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CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course Title & Code	Credits	Credit Distribution of the Course			Eligibility Criteria	Pre-requisite
		Lecture	Tutorial	Practical/Practice		
Teacher and Society **AE &VAC: 5.5**	2	-	-	2	Class XII	Nil

5.5.1 About the Course and Learning Objectives

The focus of the course on 'Teacher & Society' is on developing an understanding among student teachers of the roles of teachers in the emerging Indian society, including the changing roles of teachers in the context of the global flows of people, culture, and resources that are shaping society, and the application of technologies that are constantly redefining not only the educational landscape but also the human relationships and social norms which are continuously undergoing change which entails a recalibration of the teacher roles aligned to the current and future realities and preparing teachers for the volatile, uncertain, complex and ambiguous world. The course enables the students to understand the roles and obligations of teachers as an architect of society based on cultural ethos, traditions, and diversity. The student teachers shall be equipped with the knowledge, capacities, and value system that enables them to act as an agent for fostering national integration, and a feeling of pride in the cultural heritage and achievements of India. This course also aims to ensure that student teachers understand their responsibility for producing a future generation that undertakes its responsibility as an awakened citizen who avoids wastage of national resources and takes up a proactive role in the emergence of India as a strong and disciplined nation.

In addition to these, the course also seeks to enable each of the student teachers to respond to the needs of students from diverse cultural, linguistic, social, and economic backgrounds; to be sensitive to gender issues; promote tolerance and social cohesion; provide special attention to students with disabilities; learn and apply new pedagogies and technologies; keep pace with current educational developments and initiatives; and keep oneself professionally engaged to update/upgrade knowledge and practice. The course also explores the relationship of the teacher with education development, community, and society.

5.5.2 Learning Outcomes

After completion of the course, it is expected that the student teachers will be able to:

- examine the relationship between teacher beliefs, values, character, social and cultural context, and teaching critically,
- conceptualize teacher agency, its individual, contextual, and structural dimensions, and how it gets impacted and in turn shapes education.

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- explain the teacher's roles and characteristics; the personal and professional self; the reflective practitioner, and their significant role in shaping self, school, and society,
- demonstrate a critical understanding of the Pedagogy of Ethic of Care in Teacher Education.
- reflect on Individual and collective pedagogical practices so as to improve learning and teaching,

UNIT – I: Understanding the Teacher: Exploring the Personal and Professional Being (5 Weeks)

A. Exploring the Social Context of Teacher: Teacher Beliefs, Values and Aspirations, Diverse Identities, Social Contexts and Commitment to Learning and Education.
B. Teacher as a Professional: Qualifications, Attitude, Aptitude, Experience.
C. The Reflective Practitioner: Nurturing the Professional Competencies through Collaborative and Collective Engagement with Self, Others, and the Social Context.

UNIT – II: Nurturing the Teacher: A Dialogue Beyond the Curricular Goals, for Life and Posterity (5 Weeks)

A. Teaching: One profession many roles
B. Holistic Teacher Development: Nurturing the Panchakoshas.
C. Developing Pedagogy of Ethic of Care in Education
D. Being a Critical Teacher: Role of Teacher in Shaping the Educational Policy, Practice, and Reforms

UNIT – III: Understanding Teachers' Agency: Shaping Education Systems and Society (5 Weeks)

A. Teachers' Agency: Individual, Cultural and Structural Dimensions; Challenges and Issues: Performativity, Non-academic Engagements, Systemic Apathy, Policy and Practices.
B. Teacher Discourses: Engaging in Critical Education, Dialogues on Power Relations associated with Gender, Ethnicity, Culture, Disability, Caste, Class, Poverty; the Reproduction of Disadvantage, and Realizing the True Human Potential.
C. Being a Critical Teacher: Raising Debates around Rapid Technological Advancement and Impact on Individual, Family, and Social Life.
D. Conceptualization of Teacher, Teaching, and Teacher Roles, 'Globalization' and the Reconstructed Nationalism Shaping the Socio-Political Milieu and Impact on the Social Psyche, Growing Materialistic Urge, Sensory Drives, and the Gradual Deterioration of the Individual and Societal Character.

5.5.3 Practicum

Following are the suggestive practicals and activities. The teachers may design more tasks based on classroom interactions and discussions.

- Take up a case study of any one teacher education Institution.
- Write a biography of any one of your favourite teachers/ Educationists.

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5.5.4 Mode of Transaction

Teacher and Society is a reflection-based course that invites teachers to re-think teachers and teaching. It awakens and inspires teachers to realize broader educational aims through an action and reflection cycle. The approach therefore would include a blend of lectures, in-class seminars, thinking exercises, critical reflections, group work, case-based approaches, and enquiry-based learning.

- Learners would also be exposed to case studies featuring teachers from a representative cross-section of Schools in India and critically analyze their exercise of agentic force in school improvement and the improvement of teaching practice.
- Situating themselves in the geo-political context, the learners will get to critically engage in some of the policy dialogues.
- Learners would reflect on their practice as pre-service interns, knowledge, skills, and understandings—and identify opportunities to apply course learnings to their school context.

5.5.5 Mode of Assessment

The entire syllabus is based on practical exercises. Being a very thought-provoking course, the assessment would largely include critical thinking kind of assignments. The following are some exemplars.

- Write your current teaching philosophy based on your beliefs and values.
- Choose any one area of immediate societal concern like environmental degradation, increasing crime against women, cybercrimes, bullying or any other and draw an action plan that you as a teacher would undertake to mobilize self, school and society towards betterment.
- Critical Reflections on popular debates around power relations associated with Gender, Ethnicity, Culture, Disability, Class, Poverty, and others
- These are just prototypes and institutes may choose either of these or think of other innovative assignments that would inculcate in future teachers a sense of belonging to society.

The examination scheme and mode shall modify and/or evolve as per the guidelines of the Examination Branch, University of Delhi, from time to time.

Assessment Component	Total Marks
Cumulative Assessment (CA)	20
End-Term Project/ Activity Bank	40
Viva-Voce	20
Total	80

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5.5.6 Suggestive Reading Materials

Teachers may suggest books/readings as per the needs of the learners and learning content.

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ANNEXURE-57

Sub: Amendment to Ordinance V

Following addition be made to Appendix-II-A to the Ordinance V (2-A) of the Ordinances of the University;

Add the following:

Syllabi of following courses based on Under Graduate Curriculum Framework -2022 implemented from the Academic Year 2022-23 are notified for information of all concerned;

SEMESTER-IV (Bachelor of Vocation – Web Designing)

1. **Discipline Specific Core (DSC)**
   (i) Full Stack web development
   (ii) PHP Programming
   (iii) DBMS using MySQL

2. **Discipline Specific Elective (DSE)**
   (i) Data Privacy
   (ii) Ethical Hacking

Syllabi alongwith credit distribution is enclosed at ***Annexure-1***

ANNEXURE-1

INDEX

KALINDI COLLEGE

SEMESTER – IV

Bachelor of Vocation- Web Designing

DISCIPLINE SPECIFIC CORE COURSE – 10 Full Stack Web Development -1

Course title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
Full Stack Web Development -1	4	3	0	1	Class XII Pass	Introduction to Web Programming (DSC-05)

Learning Objectives

1. To introduce the fundamentals of the Internet, and the principles of web design.
2. To construct basic websites using JQuery and AJAX.

Learning Outcomes

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

1. Assimilate and master the latest framework like frameworks like js, Node.js, and MongoDB.
2. Build a Responsive Web application using Angular Typescript
3. Implement Angular Binding and events with templates
4. Write queries in Mongo database.
5. Implement Mongo databases and formulate queries for data retrieval and data update problems.

SYLLABUS OF DSC-10

Unit 1 Introduction to JQuery (12 hours)

JQuery Introduction, JQuery Syntax, JQuery Selectors, JQuery Events, JQuery Effects- JQuery Hide/Show, JQuery Fade, JQuery Slide(), JQuery Animate, JQuery Stop(), JQuery Callback, JQuery Chaining, JQuery AJAX- JQuery AJAX Introduction, JQuery Load, JQuery Get/Post, JQuery HTML, JQuery Get, JQuery Set, JQuery Add, JQuery Remove, JQuery CSS Classes, JQuery CSS(), JQuery forms.

Unit 2 Introduction to Angular JS (6 hours)

Angular Architecture, Building blocks of Angular, Angular CLI and commands, Angular Modules, Understanding files in Angular, Angular forms.

Unit 3 Working of Angular Applications (9 hours)

Angular App Bootstrapping ,Angular Components, Creating A Component Through Angular CLI , Ways to specify selectors , Template and styles , Installing bootstrap to design application , Data Binding , Types of Data Binding , Component Interaction using @Input and @Output decorator , Angular Animations , Component Life-cycle Hooks , Angular Directives.

Unit 4 Introduction of Mongo DB (9 hours)

Overview , Design Goals for Mongo DB Server and Database, Mongo DB Tools , How to modularize code by separating routes , Usage of various Mongo DB Tools available with Mongo DB Package , Mongo DB Development Architecture.

Unit 5 Crud Operations (9 hours)

Mongo DB CRUD Introduction, Mongo DB Datatypes , Analogy between RDBMS & Mongo DB Data Model, Mongo DB Data Model (Embedding & Linking), Challenges for Data Modelling in Mongo DB.

Practical component

Experiment1:

Write a JQuery program to retrieve element Id's & classes of HTML elements of below program.

```
<!DOCTYPE html>
<html>
<head>
<style>
/* Style the element with the id "myHeader" */
#myHeader {
  background-color: lightblue;
```

```
  color: black;
  padding: 40px;
  text-align: center;
}

/* Style all elements with the class name "city" */
.city {
  background-color: tomato;
  color: white;
  padding: 10px;
}
</style>
</head>
<body>

<h2>Difference Between Class and ID</h2>
<p>A class name can be used by multiple HTML elements, while an id name must only be used by one HTML element within the page:</p>

<!-- An element with a unique id -->
<h1 id="myHeader">My Cities</h1>

<!-- Multiple elements with same class -->
<h2 class="city">London</h2>
<p>London is the capital of England.</p>

<h2 class="city">Paris</h2>
<p>Paris is the capital of France.</p>

<h2 class="city">Tokyo</h2>
<p>Tokyo is the capital of Japan.</p>
```

```
</body>
</html>
```

Experiment 2:

Program for Selectors in jquery?

1. On click of a button, welcome message should display.
2. There are five input textboxes. On click of the input box , the background colour should change to yellow. (Hint : use *this*)
3. Remove and add different style to the element by using JQuery. Create two style classes and by default apply first one to one element. On click of a button change the elements associated property to other style.
4. Toggle the style properties of the element on click
5. Create one button and a textbox. On click of the button the text written in text box should display on the button.

Experiment 3:

Program to use show(), hide() and toggle() ?

1. Create a div tag and it should display Welcome message (by using JQuery)
2. Create two div tags and assign yellow as background colour to both of them by using JQuery.
3. Display and hide message shown in the div tag on click of the buttons. You can use Jquery show hide.
4. Display and hide message by using a single button . You can use Jquery toggle().
5. Create a div tag and on click of a button it should display your name.

Experiment 4:

1. Create one style class and name it *error*, give its border colour as red and background colour as yellow. Apply this class to the text box when the focus is moved out of it and if entered data is more than 10.
2. Create two textboxes and one button with + on it. On click of the button you should display sum of the two entered numbers in textbox. Similarly add Subtract, Multiple and Division buttons.
3. Your buttons in above code will remain in disable state till both the inputs are filled. (Use one function to enable or disable buttons. Trigger that function with on Blur events of the textboxes)

Experiment 5:

Program to use GET and POST Methods in jquery form ?

1. Create a form asking users to enter userid and password. On submit of the form the page should submit the data to backend page written in PHP or Python. Note that you are submitting the form using JQuery so page should not reload or redirect. If submitted data is valid then the login form should show welcome message by hiding the input boxes, otherwise it should ask the user to try again.
2. You have created one style css error in previou exercise above. Use the same when wrong user id or password is entered.

Experiment 6:

Perform these angular command line Interface commands to create following angular components.

1. Command to create angular project
2. Command to create a new component
3. Command to create a new class in angular project
4. Command to create a new directive
5. Command to create a new module
6. Command to create a new angular Service

Experiment 7:

Create an Angular form (Template driven Angular form) to register a student in an university with following fields.

a) Students name
b) Students Roll No
c) Students Address
d) Students email Id
e) Students Contact Number

Input data must be printed on the console after clicking on the submitted button.

Experiment 8:

Create an Angular Form (Reactive driven Angular form) to login a user in any application with these input fields.

a) Login Id (Email Id)

b) Password (Length constraints)

Input data must be printed on the console after clicking on the submitted button.

Format of MongoDB Query

Structure of 'restaurants' collection:


```
{
  "address": {
     "building": "1007",
     "coord": [ -73.856077, 40.848447 ],
     "street": "Morris Park Ave",
     "zipcode": "10462"
  },
  "borough": "Bronx",
  "cuisine": "Bakery",
  "grades": [
     { "date": { "$date": 1393804800000 }, "grade": "A", "score": 2 },
     { "date": { "$date": 1378857600000 }, "grade": "A", "score": 6 },
     { "date": { "$date": 1358985600000 }, "grade": "A", "score": 10 },
     { "date": { "$date": 1322006400000 }, "grade": "A", "score": 9 },
     { "date": { "$date": 1299715200000 }, "grade": "B", "score": 14 }
  ],
  "name": "Morris Park Bake Shop",
  "restaurant_id": "30075445"
}
```

Based on the above format perform the below experiments.

Experiment 9:

a) Write a MongoDB query to display the fields restaurant_id, name, borough and cuisine for all the documents in the collection restaurant.

b) Write a MongoDB query to display the fields restaurant_id, name, borough and cuisine, but exclude the field _id for all the documents in the collection restaurant.

c) Write a MongoDB query to display all the restaurant which is in the borough Bronx.

d) Write a MongoDB query to display the first 5 restaurant which is in the borough Bronx.

Experiment 10:

a) Write a MongoDB query to display the next 5 restaurants after skipping first 5 which are in the borough Bronx.

b) Write a MongoDB query to find the restaurants who achieved a score more than 90.

c) Write a MongoDB query to find the restaurants that achieved a score, more than 80 but less than 100.

d) Write a MongoDB query to find the restaurants which locate in latitude value less than -95.754168.

Experiment 11:

a) Write a MongoDB query to find the restaurants which do not prepare any cuisine of 'American' and achieved a grade point 'A' not belongs to the borough Brooklyn. The document must be displayed according to the cuisine in descending order.

b) Write a MongoDB query to find the restaurant Id, name, borough and cuisine for those restaurants which contain 'Wil' as first three letters for its name.

c) Write a MongoDB query to find the restaurant Id, name, borough and cuisine for those restaurants which contain 'ces' as last three letters for its name.

d) Write a MongoDB query to find the restaurant Id, name, borough and cuisine for those restaurants which contain 'Reg' as three letters somewhere in its name.

Experiment 12:

Create a Full Stack Web application Portal using Angular JS and Mongo DB.

Application Name – College Feedback Application

Technology used – Angular JS and Mongo DB

Users – Faculty, Students, Administrator

Requirements – Faculty can develop or create a Feedback form from predefined fields.

Faculty can filter/choose the students list as per the requirements.

Faculty can set the time limit to post the feedback.

Students can find the feedback lists for those they are authorized.

Students can submit the feedback.

Data must be stored as Key-Value pair in Mongo DB and use HTML, CSS and Angular JS for user interface.

Essential readings

1. Brad Dayley, Node.js, Mongo DB and Angular Web Development: The definitive guide to using the MEAN stack to build web applications (Developer's Library), 2nd edition, Addison-Wesley, 2018.
2. Cody Lindley, JQuery Cookbook, O'Reilly, 2009.

DISCIPLINE SPECIFIC CORE COURSE – 11 PHP Programming

Course title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
PHP Programming	4	3	0	1	Class XII Pass	NA

Learning Objectives

This course is designed to develop an understanding of the functionality and utility of PHP scripts and the usage of syntax, variables, and datatypes available in PHP. It provides the necessary knowledge to create basic web applications using PHP script.

Learning Outcomes

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

1. Implement the installation and deployment of PHP.
2. Develop simple programming constructs in PHP.
3. Design and develop simple, dynamic web applications using PHP scripts.

SYLLABUS OF DSC-11

Unit 1 Introduction to PHP (6 hours)

PHP introduction, inventions, and versions, important tools and software requirements (like Web Server, Database, Editors etc.), PHP with other technologies, the scope of PHP, Basic Syntax, PHP variables and constants, Types of data in PHP, Expressions, scopes of a variable (local, global), PHP Operators: Arithmetic, Assignment, Relational, Logical operators, Bitwise, ternary Grade A Grade B Grade C Grade and MOD operator, PHP operator Precedence and associativity.

Unit 2 Handling HTML form with PHP (6 hours)

Capturing Form Data, GET and POST form methods Dealing with multi-value fields Redirecting a form after submission

Unit 3 PHP conditional events and Loops (6 hours)

PHP IF Else conditional statements (Nested IF and Else) Switch case, while, For and Do While Loop, Goto, Break, Continue, and exit.

Unit 4 PHP Functions (9 hours)

Function, Need of Function, declaration and calling of a function, PHP Function with arguments, Default Arguments in Function, Function argument with call by value, call by reference, Scope of Function Global and Local.

Unit 5 String Manipulation and Regular Expression (9 hours)

Creating and accessing String, Searching & Replacing String, Formatting, Joining and Splitting String, String Related Library functions, Use and advantage of regular expression over inbuilt function, Use of preg_match(), preg_replace(), preg_split() functions in the regular expression.

Unit 6 Array (9 hours)

Anatomy of an Array, Creating index-based and Associative array, Accessing array Looping with Index-based array, with associative array using each() and foreach(), Some useful Library function.

Practical component

Experiment1:

Write a simple program to check the eligibility of a candidate in India to caste a vote (on the basis of Age).

Experiment 2:

Use PHP operators to find the cube root and square root of a given number n. If the number is not a perfect cube/square then return its floor value.

Experiment 3:

Write a PHP script to print the below following pattern.

a)

```
        1
    1   0   1
1   0   1   0   1
```

Experiment 4:

Write a PHP script to find the Highest common factor, GCD of given two numbers a and b.

Experiment 5:

Create a HTML Form to register a student in a university with the following fields:

f) Students name
g) Students Roll No
h) Students Address
i) Students email Id
j) Students Contact Number

The fields should be submitted to students.php file with request type:

1) POST

2)GET

Experiment 6:

Write a PHP script to Sort an Array of objects of object fields.

Experiment 7:

Write a PHP program to find the factorial of a number using while loop, for loop and do while loop.

Experiment 8:

Write a program to find the Fibonacci series of a number N by using

a) Recursive Approach
b) Iterative Approach

Experiment 9:

You need to write a PHP script that will convert convert temperatures between Celsius & Fahrenheit. The input parameters should be the temperature value and the unit (Celsius or Fahrenheit). The script will return the convert value in the other unit.

Experiment 10:

Create a PHP script that shows a list of products in a simple e-commerce catalog. Each product will have a name, description, price and featured image. You can store the product data in an array, a JSON file or a database. The script should generate an HTML page that will display the product details in a user-friendly format.

Experiment 11:

Write a PHP script to validate emailID and phone no. using regular expression using "preg_match()".

Experiment 12:

An English paragraph is given

"#Video provides a powerful way to help you prove your point, When you click Online Video, you can paste in the embed code for the video you want to add. You can also type @ keyword to search online for the video th@t best fit$ your document.

*## To make your document look professionally produced, Word provide$ header, footer, cover p@ge, and text box designs that complement each other. For ^example,% you can add a matching cover page, **header, and sidebar. Click Insert and then choose the elements you want from the different galleries%."*

Write a PHP program to remove all the special characters, convert all uppercase to lowercase, replace space with tab using PHP String Functions and regular expression functions.

Experiment 13:

Write a PHP script to rotate an array by K elements.

Experiment 14:

Write a PHP script to check whether the given numbers *a* and *b* are Anagrams or not (Two integers are considered to be digit anagrams if they contain the same digit or one can be obtained from the other by rearranging it).

Experiment 15:

Create an associative array to store marks in five subjects of a student, where key is subject name and value is marks in the subject. Display all keys and values. Also sort the array on the basis of the key.

Experiment 16:

Find all the leader in the given array. Leader is defined as the number after which all the numbers are less than that.

Example :

$myArr = 2 8 3 6 4 1

Output : Leaders are – 1,4,6,8

Experiment 17 :

Write a program in PHP Script where a Indexed based array and a number K is given. Check whether an array contains the two numbers whose sum is equal to K.

Example : $myArr = 3,7,6,9,2 K = 9

Output = True (3 & 6)

Experiment 18:

Write PHP script to

a) Create a database “CollegeWebsite”
b) Create a table “User (username varchar(120), password varchar(10))” within database “CollegeWebsite”.
c) Create a login page, which asks the user for a username and password. On clicking submit, a welcome message should be displayed if the user is already registered (i.e., name is present in the database) otherwise an error message should be displayed.

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Essential readings

1. Steven Holzner, PHP: The Complete Reference, 1st Edition, McGraw Hill Education, 2007.
2. Timothy Boronczyk, Martin E. Psinas, PHP and MYSQL (Create-Modify-Reuse), Wiley India Private Limited, 2008.
3. Robin Nixon, Learning PHP, MySQL, JavaScript, CSS & HTML5, 3rd Edition, O'Reilly, 2014.
4. Luke Welling, Laura Thompson, PHP and MySQL Web Development, 4th Edition, Addison-Wesley, 2008.

DISCIPLINE SPECIFIC CORE COURSE – 12 DBMS using MySQL

Course title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
DBMS using MySQL	4	3	0	1	Class XII Pass	NA

Learning Objectives

The course introduces the students to the fundamentals of database management system and its architecture. Emphasis is given on the popular relational database system including data models and data manipulation. Students will learn about the importance of database structure and its designing using conceptual approach using Entity Relationship Model and formal approach using Normalization. The importance of file indexing and controlled execution of transactions will be taught. The course would give students hands-on practice of structured query language in a relational database management system and glimpse of basic database administration commands.

Learning Outcomes

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

1. Use database management system software to create and manipulate the database.
2. Create conceptual data models using entity relationship diagrams for modeling real-life situations and design the respective database schema.
3. Use the concept of functional dependencies to remove redundancy and update anomalies.
4. Apply normalization theory to get a normalized database scheme.
5. Write queries using relational algebra.
6. Implement relational databases and formulate queries to get the desired solutions for a broad range of data retrieval and data update problems using MySQL.

SYLLABUS OF DSC-12

Unit 1 Introduction to Database (6 hours)

Purpose of database system, Characteristics of database approach, data models, database management system, database system architecture, three-schema architecture, components of DBMS, data independence, and file system approach vs database system approach.

Unit 2 Entity-Relationship Modeling (6 hours)

Conceptual data modeling - motivation, entities, entity types, attributes, relationships, relationship types, constraints on relationship, Entity Relationship diagram notation.

Unit 3 Relational Data Model (9 hours)

Update anomalies, Relational Data Model - Concept of relations, schema-instance distinction, keys, relational integrity constraints, referential integrity and foreign keys, relational algebra operators and queries.

Unit 4 Structured Query Language (SQL) (9 hours)

Querying in SQL, DDL to create database and tables, table constraints, update database-update behaviors, DML, aggregation functions, group by and having clauses, retrieve data from the database, generate and query views. Access and manipulate databases using ODBC. Basic Database administration SQL commands.

Unit 5 Database Design (9 hours)

Mapping an Entity Relationship model to the relational database, functional dependencies and Normal forms, 1NF, 2NF, 3NF and BCNF decompositions and desirable properties of them.

Unit 6 File Indexing and Transaction Processing (6 hours)

Data Storage and Indexes- Need of file indexes, file organizations, index structures, single- and multi-level indexing, concurrent execution of transactions, ACID properties, need of data recovery and log file.

Practical component

Practical based on MySQL.

1. Create a table EMPLOYEE with following schema:

(**Emp_no**, E_name, E_address, E_ph_no, Dept_no, Dept_name,Job_id(char) , Salary)

Write SQL statements for following queries:

i. Add a new column; Hire_Date to the existing relation.

ii. Change the datatype of Job_id from char to varchar2.

iii. Change the name of column Emp_no to E_no.

2. Create a table named EMPNEW with the following structure:

EMPNO NUMBER (5)
ENAME VARCHAR2 (20)
JOB VARCHAR2 (10)
DEPTNO NUMBER (3)
SALARY NUMBER (7,2)

Write SQL statements for following queries:

i. Allow NULL for all columns except EMPNO,ENAME and JOB.

ii. Add constraints to check, while entering the EMPNO > 100.

iii. Define the field DEPTNO as unique.

iv. Create a primary key constraint for the table (EMPNO).

v. Create a foreign key constraint on the EMPNEW table's attribute EMPNO, referencing the EMPLOYEE table's Emp_no column.

3. Create a table DUEMPLOYEE with following schema:

*(**Emp_no**, E_name, E_address, E_ph_no, Dept_no, Dept_name,Job_id , Salary)*

Write SQL statements for following queries:

i. Insert atleast 5 rows in the table.

ii. Display all the information of DUEMPLOYEE table.

iii. Display the record of each employee who works in department CS.

iv. Update the city of Emp_no-2 with current city as New Delhi.

v. Delete the email_id of employee whose Emp_no is 5.

4. Create a table INDUSTRYEMPLOYEE with following schema:

*(**Emp_no**, E_name, E_address, E_ph_no, Dept_no, Dept_name,Job_id, Designation,Date_of_Joining, Salary)*

Write SQL statements for the following queries.

i. List the Emp_no, E_name, Salary of all employees working as MANAGER.

ii. Display all the details of the employees whose salary is more than the Salary of any SOFTWARE ENGINEER.

iii. List the employees in the ascending order of Designations of those joined after 2023.

iv. List the E_name those are starting with 'A'.

v. List all the employees except VICE PRESIDENT in asc order of Salaries.

5. Create a table DEPARTMENT with following schema:

*(**Dept_no**, Dept_name,No_of_Emp)*

Write SQL statements for the following queries.

i. Display all the Dept_no available with the DEPARTMENT and INDUSTRYEMPLOYEEtables avoiding duplicates.

ii. Display all the Dept_no available with the DEPARTMENT and INDUSTRYEMPLOYEEtables.

iii. Display all the Dept_no available in INDUSTRYEMPLOYEE table and not in DEPARTMENT table and vice versa.

6. Consider the following schemas:

Sailors(**sid**,sname,rating,age)

Boats(**bid**,bname,color)

Reserves(**sid,bid**,day(date))

Write SQL statements for the following queries.

i. Find all information of sailors who have reserved bid 101.

ii. Find the name of boat reserved by Arun.

iii. Find the names of sailors who have reserved a red boat, and list in the order of age.

iv. Find the names of sailors who have reserved at least one boat.

v. Find the ids of sailors who have reserved a red boat or a green boat.

vi. Find the name and the age of the youngest sailor.

vii. Count the number of different sailor names.

viii. Find the average age of sailors for each rating level.

7. Create a table CSINDUSTRYEMPLOYEE with following schema: *(**Emp_no**, E_name, E_address, E_ph_no, Dept_no, Dept_name,Job_id, Designation,Date_of_Joining, Salary,Manager_name)*

Write SQL statements for the following queries.

i. Display total salary spent for each Job_id.

ii. Display lowest paid employee details under each manager.

iii. Display number of employees working in each department and their department name.

iv. Display the details of employees according to salary in decreasing order.

v. Show the record of employee earning salary greater than 50000 in each department.

Essential Readings

1. Elmasri Ramez, Shamkant B. Navathe, Fundamentals of Database Systems, 7th Edition, Pearson Education, 2015.
2. Jesper Wisborg Krogh, MySQL Connector/Python Revealed: SQL and NoSQL Data Storage Using MySQL for Python Programmers, Apress, 2018.
3. Joel Murach, Murach's MySQL, 3rd edition, Pearson, 2019.

Suggested Readings

1. Raghu Ramakrishnan, Johannes Gehrke, Database Management Systems, 3rd Edition, McGraw-Hill, 2014.
2. Abraham Silberschatz, Henry F. Korth, S. Sudarshan, Database System Concepts, 7th Edition, McGraw Hill, 2021.
3. Thomas Connolly, Carolyn Begg, Database Systems: A Practical Approach to Design, Implementation, and Management, 6th edition, Pearson, 2021.

DISCIPLINE SPECIFIC ELECTIVE COURSE – DSE 2A DATA PRIVACY

Course title & Code	Credits	Credit distribution of the course			Eligibility Criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
Data Privacy	4	3	0	1	Class XII Pass	NA

Learning Objectives

The course is designed to introduce privacy, social behavior, policy, professional practices and security issues in social networking systems.

Learning Outcomes

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

1. Identify and analyze data privacy-related security problems and quantifying the risks faced in computer systems and networks.
2. Understand the workings of the standard security mechanisms.
3. Understand
4. Introduce security management in the cloud.
5. Describe the important provisions of the Personal Data Protection Bill.

SYLLABUS OF DSE 2A

Unit 1 Introduction to Data Privacy (9 hours)

Data Life Cycle, Privacy concern in clouds, Protecting privacy, Privacy risk management, legal and Regulatory implications (IT Law), International law and Regulations.

Unit 2 Privacy in Network (12 hours)

Privacy concerns in networked technology, contextual influences on privacy attitudes and behaviors, Anonymity in the networked world, ethical problems posed by emerging social media technologies, basis of tracking social media.

Unit 3 Security Management in Cloud (12 hours)

Security Management Standards, Security Management in cloud, Availability Management, SAAS Availability Management, PAAS Availability Management, IAAS Availability Management, Access Control, Security Vulnerability, Patch and Configuration management, Geo Tagging.

Unit 4 Personal Data Protection Bill (12 hours)

3(29) Personal Data, 3(35) Sensitive Personal Data, Sections - 12, 13, 14, 16, 17, 69, 75, Offences (90-96).

Practical component

Practical exercises based on the syllabus.

Essential Readings

1. Tim Mather, Subra Kumaraswamy, Shahed Latif, Cloud Security and Privacy: An enterprise perspective on risks and compliance, O'Reilly, 2009.

2. www.meity.gov.in

DISCIPLINE SPECIFIC ELECTIVE COURSE – DSE 2B Ethical Hacking

Course title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
Ethical Hacking	4	3	0	1	Class XII Pass	NA

Learning Objectives

This course introduces the concepts of Ethical Hacking and gives the learner the opportunity to learn about different tools and techniques in Ethical hacking and security, to identify and analyze the stages an ethical hacker requires to take in order to compromise a target system as well as will apply preventive, corrective and protective measures to safeguard the system.

Learning Outcomes

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

1. Identify the tools and techniques required to carry out penetration testing
2. Identify, evaluate, treat, and report the security vulnerabilities of various security techniques used to protect system and user data.
3. Implement robust security measures and strengthen the overall security of the network.
4. Demonstrate the concepts of security at the level of policy and strategy in a computer system.

SYLLABUS OF DSE-2B

Unit 1 Introduction (6 hours)

Ethical Hacking Overview - Role of Security and Penetration Testers - Penetration-Testing Methodologies- Laws of the Land - Overview of TCP/IP- The Application Layer - The Transport Layer - The Internet Layer - IP Addressing - Network and Computer Attacks - Malware - Protecting Against Malware Attacks.- Intruder Attacks - Addressing Physical Security

Unit 2 Foot Printing, Reconnaissance and Scanning Networks (9 hours)

Footprinting Concepts - Footprinting through Search Engines, Web Services, Social Networking Sites, Website, Email - Competitive Intelligence - Footprinting through Social Engineering - Footprinting Tools - Network Scanning Concepts - Port-Scanning Tools - Scanning Techniques - Scanning Beyond IDS and Firewall

Unit 3 Enumeration and vulnerability analysis (9 hours)

Enumeration Concepts - NetBIOS Enumeration – SNMP, LDAP, NTP, SMTP and DNS Enumeration - Vulnerability Assessment Concepts - Desktop and Server OS Vulnerabilities - Windows OS Vulnerabilities

Unit 4 System hacking (12 hours)

Hacking Web Servers - Web Application Components- Vulnerabilities - Tools for Web Attackers and Security Testers Hacking Wireless Networks - Components of a Wireless Network – Wardriving- Wireless Hacking

Unit 5 Network protection systems (9 hours)

Access Control Lists. - Cisco Adaptive Security Appliance Firewall - Configuration and Risk Analysis Tools for Firewalls and Routers - Intrusion Detection and Prevention Systems – Network-Based and Host-Based IDSs and IPSs - Web Filtering - Security Incident Response Teams – Honeypots.

Practical component

Practical exercises based on the syllabus.

Essential Readings

1. Michael T. Simpson, Kent Backman, James E. Corley, Hands-On Ethical Hacking and Network Defense, Course Technology, Delmar Cengage Learning, 2010.
2. Patrick Engebretson, The Basics of Hacking and Penetration Testing, 2nd Edition, Syngress, Elsevier, 2013.
3. Dafydd Stuttard, Marcus Pinto, The Web Application Hacker’s Handbook: Finding and Exploiting Security Flaws, 2nd Edition, Wiley, 2011.

Suggested Readings

1. Justin Seitz, Black Hat Python: Python Programming for Hackers and Pentesters, 2014.

ANNEXURE-58

Sub: Amendment to Ordinance V

Following addition be made to Appendix-II-A to the Ordinance V (2-A) of the Ordinances of the University;

Add the following:

Syllabi of following courses based on Under Graduate Curriculum Framework -2022 implemented from the Academic Year 2022-23 are notified for information of all concerned;

1. Semester-IV syllabi of BA (Prog.) with Education (Major/ Non-Major) under the Department of Education [EC Resolution No. 39-1-2/] – ***As per Annexure-1***

2. Semester-VI Syllabi of BA (Prog.) Economics as Major/ Non-Major Discipline under Department of Economics [EC Resolution No. 39-1-3/] – ***As per Annexure- 2***

ANNEXURE-1

Based on Undergraduate Curriculum Framework 2022

UNIVERSITY OF DELHI

UNDERGRADUATE PROGRAMMESOF STUDY

STRUCTURE, COURSES&SYLLABI OF SEMESTER -IV

Disclaimer: The syllabi are uploaded are as approved by the Academic Council on ..... and Executive Council on .....

COURSES OFFERED BY DEPARTMENT OF EUCATION

Category II

(B.A Programme Courses for Undergraduate Programme of study with Education discipline as one of the Core Disciplines)

DISCIPLINE SPECIFIC CORE COURSE – 7 (DSC-7): EDUCATIONININDIA:POLICYAND PRACTICE

Credit distribution, Eligibility and Prerequisites of the Course

Course title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
EDUCATIONININDIA:POLICY AND PRACTICE DSC 7	4	3	1	-	• Class XIIth Pass	• No Pre-requisite

Learning Objectives

The learning objectives of the course are as follows

- To provide an overview of educational policy and practices that have influenced development of school and higher education in India.
- To introduce significant perspectives and processes of educational policy making and planning in the country.
- To gain an insight about institutions of school education and Higher Education in India and also the programmes and schemes that have influenced educational access and opportunities.

Learning Outcomes

On Completion of the course, learners are expected to:

- build a critical understanding about major policies of education in India
- develop familiarity with indicators of educational development
- describe different educational systems at the school and higher education level

- identify problems, challenges and issues at different levels of education.
- understand the role of regulatory bodies at different levels of education
- examine global changes that impact education

SYLLABUS OF DSC- 7

UnitI:UnderstandingEducational Policy in India (12hours)

- Overview of policies in India; National Policy of Education, 1968, National Policy of Education 1986, Programme of Action 1992
- Educational planning in India and financing: Indicators of Education - GER, NER, Pupil-Teacher ratio

UnitII:SchoolEducation in India (18 hours)

- Common School System: Kothari Commission Report and Vision of Common Schooling
- Systems of Schools: Types and Affiliation, Public, Private, Central, State Government, Aided and Schools run by Autonomous Bodies.
- Issues of regulation of private schools.
- The role of various national, state and local level bodies in school education like National Council for Educational Research and Training (NCERT), State Council of Educational Research and Training (SCERT), DIETs, NIOS, Boards of Education: National, International and State Boards.
- Important Government Initiatives: Sarva Shiksha Abhiyan (SSA), Rashatriya Madhyamik Shiksha Abhiya (RMSA), Rashtriya Uchchatar Shiksha Abhiyan (RUSA), Samagra Shiksha, Mid-day Meal Program (Space for eating Together).

UnitIII:HigherEducation in India (15 hours)

- Issues in Higher Education: Access, Equity, Relevance, Quality
- Challenges of quality and regulations in Higher Education-- The role of University Grants Commission (UGC) and National Assessment and Accreditation Council (NAAC)
- Types of Universities: Central, State, Private; Open and Deemed
- ContemporaryIssues: Role oftheglobalmarket;GATS in education.

Suggested Projects /Assignments

1. Build a perspective from data on education of specific social groups (girls, Dalit, tribal, disability) from Census, DISE, Select Education Statistics, and All India Education Survey Report (NCERT) regarding access to education, enrolment-retention at various levels of education and achievement of students.
2. Detailed Study of midday meal scheme (www.righttofoodindia.org) or any other school linked schemes of the Central Government.
3. Examine any course offered to students through franchising or joint ventures of trans

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national institutions.

4. Prepare a report on schemes that are currently operational in government schools introduced for welfare of children in last five years.

Note: On the basis of the above, the teacher may design his/her own relevant assignments and projects.

Essential Readings:

- Apple, M. W. (2008). Can Schooling Contribute to a More Just Society? *Education, Citizenship and Social Justice*, 3(3), 239–261.
- Bhushan, S.(2009). Foreign Universities in India. In Bhushan, S. (Ed).*Restructuring Higher Education in India*. Rawat Jaipur: Rawat Publication.
- GOI. (1966). *Report of the Education Commission: Education and National Development.* New Delhi: Ministry of Education.
- Gupta, A. (2011). *Kya Nijikaran Sahayakho Sakta Hai in Ucchtar Shikshake Badalte Ayaam*. Delhi University :Hindi Karyanvya Nideshalaya.
- Hallack, J. (2003). Education and Globalisation. In J.B.G. Tilak (Ed). Education, Society and Development. New Delhi: NIEPA
- Juneja, N. (2011). Access to What? Diversity and Participation In R. Govinda (Ed.) *Who Goes to School? Exploring Exclusion in Indian Education.* India: Oxford University Press. pp. 205- 247.
- Juneja, N.(2003). Constitutional Amendment to Make Education a Fundamental Right, *Occasional Paper*, New Delhi: NUEPA pp 6-13. Retrieved from http://www.nuepa.org/Download/Publications/Occasional%20Paper-33njuneja.pdf
- NUEPA(2008).*Elementary Education in India : Progress towards UEE*, DISE data 2006-07. Retrieved from http://dise.in/Downloads/Publications
- Public Report on Basic Education (1999) New Delhi: Oxford University Press (also in Hindi)
- Rampal, A. and Mander, H. (2013, July. 13). Lessons on Food and Hunger: Pedagogy of Empathy for Democracy. *Economic and Political Weekly* 48(28), 50-57.
- Sadgopal, A. (2008). *Samaan School Pranaliyonki Zarurat. Aaj ka Savaal. In Shiksha Aur Bhoomandali karan.* India: Shabd Sansadhan Prakashan.
- Sinha, S. & Reddy, A. (2011). School Drop Outs or Push outs. In R. Govinda (Ed.) *Who Goes to school? Exploring Exclusion in Indian Education.* India: Oxford University Press.

Internet Resource:

- National Council for Educational Research and Training (NCERT- www.ncert.nic.in).
- State Council of Educational Research and Training (SCERT), DIETs, Block Resource Centres (BRC) etc delhi.gov.in/wps/wpm/connect/ doit/scert/Scert+Delhi/home/

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- Samagra Shiksha from samagra.mhrd.gov.in
- SSA from https://mhrd.gov.in>ssa-o
- RMSA from rmsaindia.gov.in
- RUSA from http://mhrd.gov.in>rusa
- Mid day meal http://mhrd.gov.in>mid-day-meal

Additional Readings

- Naik, J.P. (1979). Equality, Quality and Quantity: The Elusive Triangle in Indian Education, *International Review of Education* , Vol. 25, (2/3), Jubilee Number (1979), pp. 167-1
- Naik, J.P. (2016). The Role of Government of India. India: Education, Ministry of Education, Government of India
- Powar, K. B. (2011). Indian Higher Education Revisited: Continuing Concerns and Emerging Issues. Delhi: Vikas Publishing House, Delhi. pp62- 79
- Subimal, S. (2011).Democracy, Decentralized Planning and Devolution of Power in Education. In K. N. Panikkar& M. Bhaskaran N. (Ed).*Emerging Trends in Higher Education in India: Concepts and Practices*. New Delhi: Pearson Education India.

Teaching Learning Process

The Course will be taught through interactive pedagogic methods such as classroom discussion, debates, film discussions, critical media analysis. Collaborative learning tasks, enhancing reading comprehension of core writings in the area and developing innovative projects. Reflective expression and learning will be encouraged.

Assessment Method

The assessment will be formative in nature and will include student participation. Individual and group tasks and assignments will be given. Summative evaluation will be through end semester examination.

Key words

Education, India, Policy

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DISCIPLINE SPECIFIC CORE COURSE – 8 (DSC-8): PROFESSIONAL DEVELOPMENT OF EDUCATIONAL PRACTITIONERS

Credit distribution, Eligibility and Prerequisites of the Course

Course title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
PROFESSIONAL DEVELOPMENT OF EDUCATIONAL PRACTITIONERS DSC 8	4	3	1	-	• Class XIIth Pass	• No Pre-requisite

Learning Objectives

The Learning Objectives of this course are as follows:

- Know about the concept, scope and importance of Professional Development of Educational Practitioners.
- Understand and analyze the various policies recommendations for professional development of educational practitioners in India.
- Examine the problems in implementation of the policies for professional development of teachers.
- Explore the role and functions of different agencies of having responsibility of professional development of educational practitioner

Learning Outcomes

On completion of this course, learners will be able to:

- explain the conceptof professional development of teachers and concerns of teachers' professional development.
- critically examine the issues of initial teacher preparation and continuous professional development of teachers.
- critically examine the policy imperatives in teachers' professional developmentand the role of agencies and regulatory bodies for quality, including the issue of governance in teacher education.
- develop the self -regulated professional development schemes

SYLLABUS OF DSC- 8

Unit: 1 Introduction to Professional Development **(Hours 15)**

- Concept of Profession, Professionalism, Professional development: Need, Characteristics and importance of professional development, Understanding teaching as a profession and its characteristics, Evolving Roles of a teacher and teacher Education,
- Professional Development of teachers- meaning, need and significance, Teacher Effectiveness- meaning, criteria for assessment and modification of teacher professional development, Characteristics of good teacher with reference to professional ethics, autonomy, and accountability, Concept of Continuous Professional Development (CPD)
- Emerging Concerns and Challenges of Teachers: Pre-service and in-service teacher education conditions in India, Concerns of quality teacher preparation in India, Working conditions of teachers with special reference to teachers' autonomy, code of conduct and responsibilities of teachers in context of policies perspective in India.

Unit-II Perspectives of Teachers Professional Development **(Hours 15)**

- Historical perspective of professional development: Evolution of professional development of teachers.

- Models of teachers' professional development (Traditional Professional Development Model, Job-embedded Professional Development Model, Individual Guided Professional Development Model, Observation or assessment model, Development and Improvement model, Teacher training model, an inquiry model),Contemporary approaches for teacher professional growth and development
- Policy Perspectives and roles of different organisations in planning and organization of professional development programmes for teachers at different level: UGC, NCTE and (IASE Institution of Advanced Studies) in Education at higher education and NCERT, SCERT, DIETs, BRCs and CRCs at school level.

Unit III: Professional Standards for Teachers and Quality Assurance for Teaching Profession with reference to India **(Hours 15)**

- Professional Standards for teachers: Definition, core values & ethics, importance of professional standards for teachers. Professional standards in terms of: professional knowledge& understanding, professional practice & competence, professional development &growth.
- National Performance Standards for Teachers (NPST) & Perspective of National Education Policy-2020 on Professional Development.
- Evaluating Teacher's Professional Development: Basic principles to evaluate teacher development programmes, models to evaluate professional development (Gusky's model, Traditional model and ICF seven practical steps to evaluate professional development).

Essential/ Recommended Readings:

- AL-Lamki, N. (2019). The Beliefs and Practices Related to Continuous Professional Development of Teacher of English in Oman. [Doctoral dissertation, University of Leeds].
- Borko H., Jacobs, J and koellner K (2010). Contemporary Approaches to Teacher Professional Development. In Penelope P,, Eva B. B. M. (Ed). *International Encyclopaedia of Education.* Volume 7. Oxford: Elsevier. pp. 548-556
- Centers for Diseases Control and Prevention (CDCP) (2019). A Guide to Evaluating Professional Development. Atlanta, GA: Center for Disease Control and Prevention, US Dept. of Health and Human Services.

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- Cruess, R, &Cruess, .L. (2012). Teaching Professionalism - Why, What and How. *Centre for Medical , Lady Meredith* , McGill University, 4(4), 259-265.
- Edmond, N., &Hayler, M. (2013). On Either Side of the Teacher: Perspectives on Professionalism in Education. *Journal of Education for Teaching*, *39*(2), 209-221.
- Emmelian M., Melissa T, Geert D & Ruben V. (2018). Evaluating Teachers Professional Development Initiatives: Towards and Extended Evaluative Framework ,*Research Paper in Education*, 33(2), 143- 168.
- Evans, L. (2008). Professionalism, Professionality and the Development of Education Professionals. *British Journal of Educational Studies,* 56 (1), 20-38, http://dx.doi.org/10.1111/j.1467-8527.2007.00392.x
- Evetts, J. (2013). Professionalism: Value and Ideology. *Current Sociology*, *61*(5–6), 778–796.
- Guskey, T. R. (2014). Evaluating Professional Development. In Billett, S. (Ed). *International Handbook of Research in Professional and Practice Based Learning.* New York: Springer in international.
- Hall, R. H. (1968). Professionalization and Bureaucratization. *American Sociological Review*, 33(1), 92- 104.
- Hargreaves, A. (2000). Four ages of professionalism and professional learning. *Teachers and Teaching: Theory and Practice,* 6 (2), 151-182. http://dx.doi.org/10.1080/713698714
- Hargreaves, D. (1994). The New Professionalism: The Synthesis of Professional and Institutional Development. *Teaching and Teacher Education, 10*(4), 423-438.
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- Ifanti, A., & Fotopoulopou, V. (2011). Teachers' Perceptions of Professionalism and Professional Development: A Case Study In Greece. *World Journal of Education*, *1*, 40-51.
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- MHRD, (1986). *National Education Policy 1986*. India: Government of India.
- MOE, (2020). *National Education Policy 2020*. India: Ministry of Education, Government of India.

- Organization for Economic Co- Operation and Development. (2009).*Creative Effective Teaching and Learning Environments.* oecd.org/ education/ school/ 43023606.pdf
- Ravhuhali,F., Mashau,T., Kutame, A., & Mutshaeni, H.(2015).Teachers Professional Development for Effective Teaching and Learning in School: What Works best for Teacher?. *International Journal for Educational Sciences, 11:1, 57-68,* DOI: 10.1080/09751122.2015.11890375.
- Reimers, V.E. (2003). *Teacher Professional Development: An International Review of the Literature.* India: International Institute of Educational Planning.
- Sachs, J. (2016). Teacher Professionalism: Why Are We Still Talking About It? *Teachers and Teaching*, *22*(4), 413-425.
- Sockett, H. T. (1996). Teachers for the 21st century: Redefining Professionalism, *NASSP Bulletin*, May, 1996, 22-29.
- Subhitha, G. V. (2017). *Re-Conceptualizing Teachers Continuous Professional Development within a New Paradigm of Change in the Indian Context: An Analysis of Literature And Policy Documents, Professional Development in Education*, DOI: 10.1080/19415257.2017.1299029.
- Vijaysimha, I. (2013). Teachers as professional: Accountable and Autonomous? *Contemporary Education dialogue. Sage Publication,* 10(2), 293-299.
- Whitty, G. (2000). Teacher Professionalism in New Times. *Journal of In-Service Education*, *26*(2), 281-295. http://dx.doi.org/10.1080/1367458000020012

Suggested Projects/ Assignments: Any two

Educator can design the assignment and projects on the current practices adopted in school education and in higher education:

- To develop an analytical report on few case studies specially conducted on the evaluation of in-service programmes/ faculty development programmes/ refresher courses for better understanding of recent trends of professional development of teachers at different level of education viz. school, colleges, and universities.
- Assignment can be given to discuss the different types of professional development programmes in any relevant area of focus, designing of modules, execution and evaluation strategies, process of development a framework of any one professional development programme for teachers at different level,
- An exposure field visit can be scheduled to nearby SCERT, DIETs or institution working in the areas of professional development for observation of ongoing

professional development programme, interaction with educators working in these institutions along with reporting of any ongoing programme and its components.

Note: On the basis of the above, the teacher may design his/her own relevant assignments and projects.

Teaching Learning Process:

The course will be taught through interactive pedagogic methods such as classroom discussion, debates, discussions, critical media analysis, collaborative learning tasks which enhance reading comprehension of core writings in the area and innovative projects. Reflective expression and learning will be encouraged.

Assessment Method:

The assessment will be formative in nature and will factor in student participation. Individual and group tasks and assignments will be given. Summative evaluation will be done through end- semester examination.

Key words

Professional Development, Educational Practitioners

Note: Examination scheme and mode shall be as prescribed by the Examination Branch, University of Delhi, from time to time.

Category III

B.A. Programme Courses for Undergraduate Programme of study with Education discipline as one of the Core Disciplines as non-Major or Minor discipline)

DISCIPLINE SPECIFIC CORE COURSE – 7 (DSC-7): EDUCATIONININDIA:POLICYAND PRACTICE

Credit distribution, Eligibility and Prerequisites of the Course

Course title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
EDUCATIONININDIA:POLICY AND PRACTICE DSC 7	4	3	1	-	• Class XIIth Pass	• No Pre-requisite

Learning Objectives

The learning objectives of the course are as follows

- To provide an overview of educational policy and practices that have influenced development of school and higher education in India.
- To introduce significant perspectives and processes of educational policy making and planning in the country.
- To gain an insight about institutions of school education and Higher Education in India and also the programmes and schemes that have influenced educational access and opportunities.

Learning Outcomes

On Completion of the course, learners are expected to:

- build a critical understanding about major policies of education in India
- develop familiarity with indicators of educational development
- describe different educational systems at the school and higher education level
- identify problems, challenges and issues at different levels of education.

- understand the role of regulatory bodies at different levels of education
- examine global changes that impact education

SYLLABUS OF DSC- 7

UnitI:Understanding Educational Policy in India (12hours)

- Overview of policies in India; National Policy of Education, 1968, National Policy of Education 1986, Programme of Action 1992
- Educational planning in India and financing: Indicators of Education - GER, NER, Pupil-Teacher ratio

UnitII:SchoolEducation in India (18 hours)

- Common School System: Kothari Commission Report and Vision of Common Schooling
- Systems of Schools: Types and Affiliation, Public, Private, Central, State Government, Aided and Schools run by Autonomous Bodies.
- Issues of regulation of private schools.
- The role of various national, state and local level bodies in school education like National Council for Educational Research and Training (NCERT), State Council of Educational Research and Training (SCERT), DIETs, NIOS, Boards of Education: National, International and State Boards.
- Important Government Initiatives: Sarva Shiksha Abhiyan (SSA), Rashatriya Madhyamik Shiksha Abhiya (RMSA), Rashtriya Uchchatar Shiksha Abhiyan (RUSA), Samagra Shiksha, Mid-day Meal Program (Space for eating Together).

UnitIII:HigherEducation in India (15 hours)

- Issues in Higher Education: Access, Equity, Relevance, Quality
- Challenges of quality and regulations in Higher Education-- The role of University Grants Commission (UGC) and National Assessment and Accreditation Council (NAAC)
- Types of Universities: Central, State, Private; Open and Deemed
- ContemporaryIssues: Role oftheglobalmarket;GATS in education.

Suggested Projects /Assignments

5. Build a perspective from data on education of specific social groups (girls, Dalit, tribal, disability) from Census, DISE, Select Education Statistics, and All India Education Survey Report (NCERT) regarding access to education, enrolment-retention at various levels of education and achievement of students.
6. Detailed Study of midday meal scheme (www.righttofoodindia.org) or any other school linked schemes of the Central Government.
7. Examine any course offered to students through franchising or joint ventures of trans national institutions.

8. Prepare a report on schemes that are currently operational in government schools introduced for welfare of children in last five years.

Note: On the basis of the above, the teacher may design his/her own relevant assignments and projects.

Essential Readings:

- Apple, M. W. (2008). Can Schooling Contribute to a More Just Society? *Education, Citizenship and Social Justice*, 3(3), 239–261.
- Bhushan, S.(2009). Foreign Universities in India. In Bhushan, S. (Ed).*Restructuring Higher Education in India*. Rawat Jaipur: Rawat Publication.
- GOI. (1966). *Report of the Education Commission: Education and National Development.* New Delhi: Ministry of Education.
- Gupta, A. (2011). *Kya Nijikaran Sahayakho Sakta Hai in Ucchtar Shikshake Badalte Ayaam*. Delhi University :Hindi Karyanvya Nideshalaya.
- Hallack, J. (2003). Education and Globalisation.In J.B.G. Tilak (Ed). Education, Society and Development. New Delhi: NIEPA
- Juneja, N. (2011). Access to What? Diversity and Participation In R. Govinda (Ed.) *Who Goes to School? Exploring Exclusion in Indian Education.* India: Oxford University Press. pp. 205- 247.
- Juneja, N.(2003). Constitutional Amendment to Make Education a Fundamental Right, *Occasional Paper*, New Delhi: NUEPA pp 6-13. Retrieved from http://www.nuepa.org/Download/Publications/Occasional%20Paper-33njuneja.pdf
- NUEPA(2008).*Elementary Education in India : Progress towards UEE*, DISE data 2006-07. Retrieved from http://dise.in/Downloads/Publications
- Public Report on Basic Education (1999) New Delhi: Oxford University Press (also in Hindi)
- Rampal, A. and Mander, H. (2013, July. 13). Lessons on Food and Hunger: Pedagogy of Empathy for Democracy. *Economic and Political Weekly* 48(28), 50-57.
- Sadgopal, A. (2008). *Samaan School Pranaliyonki Zarurat. Aaj ka Savaal. In Shiksha Aur Bhoomandali karan.* India: Shabd Sansadhan Prakashan.
- Sinha, S. & Reddy, A. (2011). School Drop Outs or Push outs. In R. Govinda (Ed.) *Who Goes to school? Exploring Exclusion in Indian Education.* India: Oxford University Press.

Internet Resource:

- National Council for Educational Research and Training (NCERT- www.ncert.nic.in).
- State Council of Educational Research and Training (SCERT), DIETs, Block Resource Centres (BRC) etc delhi.gov.in/wps/wpm/connect/ doit/scert/Scert+Delhi/home/
- Samagra Shiksha from samagra.mhrd.gov.in

- SSA from https://mhrd.gov.in>ssa-o
- RMSA from rmsaindia.gov.in
- RUSA from http://mhrd.gov.in>rusa
- Mid day meal http://mhrd.gov.in>mid-day-meal

Additional Readings

- Naik, J.P. (1979). Equality, Quality and Quantity: The Elusive Triangle in Indian Education, *International Review of Education* , Vol. 25, (2/3), Jubilee Number (1979), pp. 167-1
- Naik, J.P. (2016). The Role of Government of India. India: Education, Ministry of Education, Government of India
- Powar, K. B. (2011). Indian Higher Education Revisited: Continuing Concerns and Emerging Issues. Delhi: Vikas Publishing House, Delhi. pp62- 79
- Subimal, S. (2011).Democracy, Decentralized Planning and Devolution of Power in Education. In K. N. Panikkar& M. Bhaskaran N. (Ed).*Emerging Trends in Higher Education in India: Concepts and Practices*. New Delhi: Pearson Education India.

Teaching Learning Process

The Course will be taught through interactive pedagogic methods such as classroom discussion, debates, film discussions, critical media analysis. Collaborative learning tasks, enhancing reading comprehension of core writings in the area and developing innovative projects. Reflective expression and learning will be encouraged.

Assessment Method

The assessment will be formative in nature and will include student participation. Individual and group tasks and assignments will be given. Summative evaluation will be through end semester examination.

Key words

Education, India, Policy

Category II

Economics Courses for Undergraduate Programme of study with Economics as one of the Core Disciplines

(B.A. Programmes with Economics as Major discipline)

DISCIPLINE SPECIFIC CORE COURSE -11 (DSC-11): Intermediate Macroeconomics II: Policy Issues

Course title & Code	Credits	Duration (per week)			Eligibility Criteria	Prerequisite
		Lecture	Tutorial	Practical/ Practice		
Intermediate Macroeconomics II: Policy Issues – ECON011	**4**	**3**	**1**	**0**	**Class 12th**	**NIL**

Learning Objectives

The Learning Objectives of this course are as follows:

- This course trains the students in policy issues faced by macroeconomists in the real world.
- It discusses issues in monetary and fiscal policies as well as exchange rate dynamics.
- It also introduces the students to the financial system and dynamics of financial crises.
- The students are introduced to macroeconomic concepts in the context of open economies and the policy issues therein.

Learning outcomes

The Learning outcomes of this course are as follows:

- This course enables students to analyse the functioning of macroeconomic policies in the real world in both closed and open economies, understand the dilemmas faced by the policymakers both in the domestic economy and in the globalised world.

Syllabus

UNIT I: Fiscal and monetary policies (15 hours)
Active or passive monetary policies; time inconsistency, monetary policy objectives and targets; rules versus discretion, IS-PC-MR model, fiscal policy, the government budget constraint; government debt and Ricardian equivalence.

UNIT II: Financial markets and crisis (15 hours)
Introduction to financial markets, Financial crises and liquidity trap

UNIT III: Issues in open economy (15 hours)

Short-run open economy models; Mundell-Fleming model, Exchange rate determination; purchasing power parity, asset market approach, Dornbusch's overshooting model; monetary approach to balance of payments, International financial markets.

Recommended readings

- Blanchard, O. (2006). *Macroeconomics*, 4th, 6th and 7th ed. Pearson Education.
- Salvatore, D. (2007), *International Economics*, Wiley.
- Dornbusch, R., Fischer, S. (1994). *Macroeconomics*, 6th ed. McGraw-Hill.
- Mishkin, Frederic (2012). *Macroeconomics: Policy & Practice*, Pearson.
- Jones, C. (2016). *Macroeconomics*, 4th ed. W. W. Norton.
- Carlin, Wendy and Soskice, David (2015) *Macroeconomics: Institutions, Instability and the Financial System.* Oxford University Press.

Note: Examination scheme and mode shall be as prescribed by the Examination Branch, University of Delhi, from time to time.

DISCIPLINE SPECIFIC CORE COURSE -12 (DSC-12): Indian Growth and Development

Course title & Code	Credits	Duration (per week)			Eligibility Criteria	Prerequisite
		Lecture	Tutorial	Practical/ Practice		
Indian Growth and Development – ECON018	**4**	**3**	**1**	**0**	**Class 12th**	**NIL**

Learning Objectives

The Learning Objectives of this course are as follows:

- Using appropriate analytical frameworks, this course reviews major trends in economic indicators of macro and development issues and policy debates in India in the post-Independence period, with particular emphasis on paradigm shifts and turning points.
- This course intends to give an introduction to students as to how they could explore problems related to the Indian economy by familiarizing them with the research studies on areas relating to economic development and policy in India with an emphasis on contemporary debates.

Learning outcomes

The Learning outcomes of this course are as follows:

- The students should be able to understand the development paradigm adopted in India since independence and evaluate its impact on economic as well as social indicators of progress.
- The students will acquire ability to explore current policy debates and contribute to policy making in an informed way using relevant databases.

Syllabus

UNIT I: Economic Growth since Independence (12 hours)
Major features of the economy at independence; growth under different policy regimes—goals, constraints, institutions and policy framework; an assessment of performance—sustainability and regional contrasts; structural change, savings and investment

UNIT II: Sectoral Performances and Concerns (12 hours)
Issues in agriculture, industry and services.

UNIT III: Inclusive Growth - trends and patterns, Distributional Issues and Policies Demography, Poverty and Unemployment (9 hours)

UNIT IV: Economic Policies and their Impact (12 hours)
Evolution of macroeconomic framework applied in Indian economy and its impact, fiscal policy; financial and monetary policies; trade and investment policy, five-year plans

Recommended readings

- Ahluwalia, M. S. (2019), "India's economic reforms: Achievements and Next Steps",
- *Asian Economic Policy Review*, 14(1), 46-62.
- Bosworth, B., Collins, S. M., & Virmani, A. (2007). *Sources of growth in the Indian economy*. Working Paper no. 12901, NBER.
- Pulapre Balakrishnan, (2007), "The Recovery of India: Economic Growth in the Nehru Era", *Economic and Political Weekly*, November 10-23, 2007.
- Krishnamurty, K. (2002), Macroeconometric Models for India: Past, Present and Prospects *Economic and Political Weekly*, October 19, 2002.
- Arvind Subramanian and Josh Felman (2021) India's Stalled Rise-How the State Has Stifled Growth, *Foreign Affairs* on 14.12.2021.
- Acharya, S. and Mehrotra, S. (2020), The Agricultural Market Reforms: Is there a trade-off between efficiency and equality? Working Paper Series, Institute of Human Development.
- Shah, Mihir (2007), Rural Credit in 20th Century India: Overview of History and Perspectives, *Economic and Political Weekly*, Vol. 42, Issue No. 15 , 14 April 2007.
- Nagaraj R (2013), India's Dream Run Understanding the Boom and Its Aftermath,
- *Economic and Political Weekly* Vol 48, No. 20,May 18, 2013.
- Chanda, R. (2019), India's Services Sector; trends, opportunities and challenges,in Uma Kapila(ed.), *Indian economy-2: Macroeconomic policies, Sectoral Develop- ments and Performance.*
- Dipak Mazumdar and Sandip Sarkar (2009) "The Employment Problem in India and the Phenomenon of the 'Missing Middle' *The Indian Journal of Labour Eco- nomics*, Vol. 52, No. 1, 2009
- Chakraborty, Achin, (2015), Reforming Labour Markets in States: Revisiting the Futility Thesis, *Economic and Political Weekly*, May 16.
- Thomas, J. J. (2020). 'Labour Market Changes in India, 2005–18', *Economic and Political Weekly*, 55(34), 57.
- James, K.S., & Srinivas Goli (2016), "Demographic Changes in India: Is the Coun- try Prepared for the Challenge?" *Brown Journal of World Affairs*, Fall/Winter 2016, Volume XXIII, Issue I.
- Desai, S. (2015), "Demographic deposit, dividend and debt", *The Indian Journal of Labour Economics*, 58, 217-232.
- Drèze, J and Khera, R., 2016, 'Recent Social Security Initiatives in India' Available at http://dx.doi.org/10.2139/ssrn.2800699.
- Vijay Joshi, (2016), *India's Long Road: The Search for Prosperity*, Allen Lane, Gurgaon, Ch 2.
- Rakesh Mohan, (2019), *Moving India to a new Growth Trajectory: Need for a Comprehensive Big Push*, Brookings India, Section 1 and 2, 9-30.
- Jagdish Bhagwati and Arvind Panagariya, (2012), *India's Tryst with Destiny*, Collins Business, Noida, pp. 4-5, 32-38.
- Panagariya A (2020), *India Unlimited: Reclaiming the Lost Glory*, Chapter 2.
- Jean Dreze and Amartya Sen, (2013), *India: An Uncertain Glory*, Allen Lane, chapters 2, 3 (pp. 72-80 only).
- Kumar, R., & Patibandla, M. (2009). *Institutional dynamics and the evolution of the Indian economy*, Springer.
- McCartney, M. (2019). *The Indian Economy*. Agenda Publishing Limited.
- Goyal, A. (Ed.). (2019). *A Concise Handbook of the Indian Economy in the 21st Century*. Oxford University Press.

Note: Examination scheme and mode shall be as prescribed by the Examination Branch, University of Delhi, from time to time.

Category III

Economics Courses for Undergraduate Programme of study with Economics as one of the Core Disciplines

(B.A. Programmes with Economics as non-Major or Minor discipline)

DISCIPLINE SPECIFIC CORE COURSE -6 (DSC-6): Indian Growth and Development

Course title & Code	Credits	Duration (per week)			Eligibility Criteria	Prerequisite
		Lecture	Tutorial	Practical/ Practice		
Indian Growth and Development – ECON018	**4**	**3**	**1**	**0**	**Class 12th**	**NIL**

Learning Objectives

The Learning Objectives of this course are as follows:

- Using appropriate analytical frameworks, this course reviews major trends in economic indicators of macro and development issues and policy debates in India in the post-Independence period, with particular emphasis on paradigm shifts and turning points.
- This course intends to give an introduction to students as to how they could explore problems related to the Indian economy by familiarizing them with the research studies on areas relating to economic development and policy in India with an emphasis on contemporary debates.

Learning outcomes

The Learning outcomes of this course are as follows:

- The students should be able to understand the development paradigm adopted in India since independence and evaluate its impact on economic as well as social indicators of progress.
- The students will acquire ability to explore current policy debates and contribute to policy making in an informed way using relevant databases.

Syllabus

UNIT I: Economic Growth since Independence (12 hours)
Major features of the economy at independence; growth under different policy regimes—goals, constraints, institutions and policy framework; an assessment of performance—sustainability and regional contrasts; structural change, savings and investment

UNIT II: Sectoral Performances and Concerns (12 hours)
Issues in agriculture, industry and services.

UNIT III: Inclusive Growth - trends and patterns, Distributional Issues and Policies Demography, Poverty and Unemployment (9 hours)

UNIT IV: Economic Policies and their Impact (12 hours)

Evolution of macroeconomic framework applied in Indian economy and its impact, fiscal policy; financial and monetary policies; trade and investment policy, five-year plans

Recommended readings

- Ahluwalia, M. S. (2019), "India's economic reforms: Achievements and Next Steps",
- *Asian Economic Policy Review*, 14(1), 46-62.
- Bosworth, B., Collins, S. M., & Virmani, A. (2007). *Sources of growth in the Indian economy*. Working Paper no. 12901, NBER.
- Pulapre Balakrishnan, (2007), "The Recovery of India: Economic Growth in the Nehru Era", *Economic and Political Weekly*, November 10-23, 2007.
- Krishnamurty, K. (2002), Macroeconometric Models for India: Past, Present and Prospects *Economic and Political Weekly*, October 19, 2002.
- Arvind Subramanian and Josh Felman (2021) India's Stalled Rise-How the State Has Stifled Growth, *Foreign Affairs* on 14.12.2021.
- Acharya, S. and Mehrotra, S. (2020), The Agricultural Market Reforms: Is there a trade-off between efficiency and equality? Working Paper Series, Institute of Human Development.
- Shah, Mihir (2007), Rural Credit in 20th Century India: Overview of History and Perspectives, *Economic and Political Weekly*, Vol. 42, Issue No. 15 , 14 April 2007.
- Nagaraj R (2013), India's Dream Run Understanding the Boom and Its Aftermath,
- *Economic and Political Weekly* Vol 48, No. 20,May 18, 2013.
- Chanda, R. (2019), India's Services Sector; trends, opportunities and challenges,in Uma Kapila(ed.), *Indian economy-2: Macroeconomic policies, Sectoral Develop- ments and Performance.*
- Dipak Mazumdar and Sandip Sarkar (2009) "The Employment Problem in India and the Phenomenon of the 'Missing Middle' *The Indian Journal of Labour Eco- nomics*, Vol. 52, No. 1, 2009
- Chakraborty, Achin, (2015), Reforming Labour Markets in States: Revisiting the Futility Thesis, *Economic and Political Weekly*, May 16.
- Thomas, J. J. (2020). 'Labour Market Changes in India, 2005–18', *Economic and Political Weekly*, 55(34), 57.
- James, K.S., & Srinivas Goli (2016), "Demographic Changes in India: Is the Coun- try Prepared for the Challenge?" *Brown Journal of World Affairs*, Fall/Winter 2016, Volume XXIII, Issue I.
- Desai, S. (2015), "Demographic deposit, dividend and debt", *The Indian Journal of Labour Economics*, 58, 217-232.
- Drèze, J and Khera, R., 2016, 'Recent Social Security Initiatives in India' Available at http://dx.doi.org/10.2139/ssrn.2800699.
- Vijay Joshi, (2016), *India's Long Road: The Search for Prosperity*, Allen Lane, Gurgaon, Ch 2.
- Rakesh Mohan, (2019), *Moving India to a new Growth Trajectory: Need for a Comprehensive Big Push*, Brookings India, Section 1 and 2, 9-30.
- Jagdish Bhagwati and Arvind Panagariya, (2012), *India's Tryst with Destiny*, Collins Business, Noida, pp. 4-5, 32-38.
- Panagariya A (2020), *India Unlimited: Reclaiming the Lost Glory*, Chapter 2.
- Jean Dreze and Amartya Sen, (2013), *India: An Uncertain Glory*, Allen Lane, chapters 2, 3 (pp. 72-80 only).
- Kumar, R., & Patibandla, M. (2009). *Institutional dynamics and the evolution of the Indian economy*, Springer.
- McCartney, M. (2019). *The Indian Economy*. Agenda Publishing Limited.
- Goyal, A. (Ed.). (2019). *A Concise Handbook of the Indian Economy in the 21st Century*. Oxford University Press.

Note: Examination scheme and mode shall be as prescribed by the Examination Branch, University of Delhi, from time to time.

Annexure-59

UNIVERSITY OF DELHI

Amendment in the Statute 9-B of the Statutes of the University regarding change of name of the Department of "Adult Continuing Education and Extension" to Department of "Continuing Education and Extension".

EXISTING	PROPOSED
Statute 9-B There shall be the following departments established in the University: (1) to (44) x x x x (45) Department of Adult Continuing Education and Extension.	**Statute 9-B** There shall be the following departments established in the University: (1) to (44) x x x x (45) Department of Continuing Education and Extension.

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Sub: Amendment to Ordinance V

Following addition be made to Appendix-II-A to the Ordinance V (2-A) of the Ordinances of the University;

Add the following:

Syllabi of following courses of Buddhist Studies based on Under Graduate Curriculum Framework -2022 implemented from the Academic Year 2022-23 are notified for information of all concerned;

SEMESTER-IV (Department of Buddhist Studies)

(i) BA (Prog.) Buddhist Studies as Major

(ii) BA (Prog) Buddhist Studies as Non-Major

Syllabi alongwith credit distribution is enclosed at ***Annexure-1***

DEAPRTMENT OF BUDDHIST STUDIES

B.A.(Prog.) with Buddhist Studies as Minor-1

CATEGORY - IV

DISCIPLINE SPECIFIC CORE COURSE – 4 (DSC-4)
CREDIT DISTRIBUTION ELGIBILITY AND PRE–REQUISITE OF THE COURSE

Course Title & Code	Total Credits	Credit distribution of the course			Eligibility Criteria/ Prerequisite	Pre-requisite of the course, if any
		Lecture	Tutorial	Practical		
Principal Elements of Theravāda Buddhists Thought DSC-4-A4	4	3	1	0	Class XII Pass	Nil

COURSE NAME: Principal Elements of Theravāda Buddhist Thoughts (DSC-4-A4)

Objective:-The primary objective of this course is to make students aware of the Principal Elements of Theravāda Buddhist Thought.

Learning Outcome: - Upon the completion of this course, students would able to have a clear understanding of Principal Elements of Theravāda Buddhist Thought along with their relevance in the Theravāda Buddhist Philosophy.

SYLLABUS OF DSC -4 -A4

Unit- I

Theravāda Etymology **8 Hours**

- Emergence of the term *Theravāda*
- *Theravāda* as *Vibhajjavāda*
- *Theravāda* Language, Literature and Region.

Unit- II

Basic Concepts of _Theravāda_ **15 Hours**

- *Ratanattayaṃ* and *Pañcasīla* and *Dasasikkhāpadaṃ*
- Nibbāna and its stages (Sotāpanna, Sakadāgāmi, Anāgāmi and Arahata)
- *Buddha, Pacceka Buddha and Arahata*

Unit- III

The Four Satipaṭṭhāna **12 Hours**

- Kāyānupassanā – Ānāpāna
- Vedanānupassanā
- Cittānupassanā
- Dhammānupassanā

Unit-IV

Concept of _Brahmavihāra_ in Theravāda Buddhism **10 Hours**

- Meaning of *Brahmavihāra* (Superior state of mind)
- Four supreme states of mind: *Mettā*, *Karunā*, *Muditā*, *Upekkhā*

Essential Readings:

- Gethin, R.M.L. 2001. *The Buddhist Path to Awakening*. Oxford: One world Publications.
- Maurice, Walshe. 1995. *The Long Discourses of the Buddha*. Boston: Wisdom Publications.
- Narada, Ven. 1998. *The Buddha and His Teachings*. Taipei: Buddha Educational Foundation.
- Śāstrī, Dvārikādāsa. 2009. *Dīghanikāyapāli. Bhāga-2*. Vārāṇasī: Bauddhabhāratī.
- Sharmā, Brahmadeva Nārāyaṇa. 2004. *Vibhajyavāda*. Vārāṇasī: Sampūrṇānanda Sanskrit Vishvavidyālaya.

Suggested Readings:

- Dutt, N. 1956. *Development of Buddhism in Uttara Pradesh*. Lucknow: Publication Bureau.
- Dutt, N. 1997. *Buddhist Sects*. Calcutta: Firma KLM (Pvt.) Ltd.
- Sangharakshit. 2006. *A Survey of Buddhism*. Delhi: Motilal Banarsidass.
- Shukla, H. S. (Ed.). 2001. *Aspects of Buddhism*. Varanasi: Banaras Hindu University.
- Walpola, Rahula. 2009. *What the Buddha Taught*. Taipei: The Corporate Body of the Buddha Educational Foundation. 1st Pub. 1978.

DEAPRTMENT OF BUDDHIST STUDIES
B.A.(Prog.) with Buddhist Studies as Major-2

CATEGORY IV
DISCIPLINE SPECIFIC CORE COURSE– 4 (DSC- 4 – B4)
CREDIT DISTRIBUTION ELGIBILITY AND PRE–REQUISITE OF THE COURSE

Course Title & Code	Total Credits	Credit distribution of the course			Eligibility Criteria/ Prerequisite	Pre-requisite of The course, if any
		Lecture	Tutorial	Practical		
COURSE NAME 'BUDDHIST SCHOOLS OF THOUGHTS' (DSC-4 B4)	4	3	1	0	Class XII Passed	Nil

COURSE NAME 'BUDDHIST SCHOOLS OF THOUGHTS' (DSC-4 B4)

OBEJCTIVE- The primary objective of this course is to:

(a) Make students aware of the schools of thoughts of Buddhist tradition through various ages and regions.

(b) Delve into the thoughts of the Buddha been focused shifted through time, language and society.

Learning Outcome: - Upon the completion of this course, students would-

(a) Able to analyze the continuity and change in understanding the teaching of the Buddha and the role of development of society, language and geographical diversities and emergence of so-called sects like Theravāda and Mahāyāna and so on through different ages and regions.

(b) Able to recognize unity in diversity of the philosophical differences among the Buddhist school of thoughts.

SEMESTER IV

COURSE NAME 'BUDDHIST SCHOOLS OF THOUGHTS' (DSC- 4 B4)

UNIT I

Origin and Development of the Sangha **12 Hours**

- Formation of the Sangha
- Hierarchy and reverence to the Buddha
- Devadatta's Five Demands (Pañcavatthūni Dhammā) and signs of division.

UNIT II

The Second Council and the Mahāsānghikas **09 Hours**

- Dasavatthūni Dhammā
- Proceedings the council and emergence of the Mahāsānghikas

UNIT III

Major Philosophical Schools of Theravāda Buddhism **12 Hours**

- Acharyas of Vaibhāṣika and Sautrāntika
- Theory of 'existence of everything' (Sarvāstivāda)
- Key concepts of Theravāda Buddhism: Anattavāda, Arahata, Nibbāna

UNIT IV

Major Schools of Mahāyāna Buddhism **12 Hours**

- Achryas of Mādhyamika and Yogācāra
- Key concepts of Mahāyāna: Bodhisattva, Nirvāṇa, Śūnyavāda

Essential Readings:

- Gethin, R.M.L. 2001. *The Buddhist Path to Awakening*. Oxford: One world Publications.
- Maurice, Walshe. 1995. *The Long Discourses of the Buddha*. Boston: Wisdom Publications.
- Narada, Ven. 1998. *The Buddha and His Teachings*. Taipei: Buddha Educational Foundation.
- Śāstrī, Dvārikādāsa. 2009. *Dīghanikāyapāli. Bhāga-2*. Vārāṇasī: Bauddha Bhāratī.
- Sharmā, BrahmadevaNārāyaṇa. 2004. *Vibhajyavāda*. Vārāṇasī: Sampūrṇānanda Sanskrit Vishvavidyālaya.
- Bapat, P.V. (ed.). 1956. *Bauddha Dharma Ke 2500 Varşa*. New Delhi, Government of India, Publication Division.
- Bapat, P.V. (ed.). 1964. *2500 Years of Buddhism*. Publications Division, Ministry of Information and Broadcasting, Government of India, New Delhi.
- Dutta, N. 1943. *Early Monastic Buddhism*, 2 Vols. Calcutta.

Suggested Readings:

- Dutt, N. 1997. *Buddhist Sects*. Calcutta: Firma KLM (Pvt.) Ltd.
- McGovern, M.W. 1922.*An Introduction to Mahāyāna Buddhism*. London: Kegan Paul, Trench, Trübner & Co.
- Sangharakshit. 2006. *A Survey of Buddhism*. Delhi: Motilal Banarsidass.
- Shukla, H. S. (Ed.). 2001. *Aspects of Buddhism*. Varanasi: Banaras Hindu University.
- Walpola, Rahula. 2009. *What the Buddha Taught*. Taipei: The Corporate Body of the Buddha Educational Foundation. 1st Pub. 1978.

DEAPRTMENT OF BUDDHIST STUDIES

B.A.(Prog.) with Buddhist Studies as Major-1

CATEGORY - IV

DISCIPLINE SPECIFIC CORE COURSE – 4 (DSC- 4)
CREDIT DISTRIBUTION ELGIBILITY AND PRE–REQUISITE OF THE COURSE

Course Title & Code	Total Credits	Credit distribution of the course			Eligibility Criteria/ Prerequisite	Pre-requisite of the course, if any
		Lecture	Tutorial	Practical		
Principal Elements of Theravāda Buddhist Thoughts DSC-4-A4	4	3	1	0	Class XII Passed	Nil

COURSE NAME: Principal Elements of Theravāda Buddhist Thoughts (DSC-4-A4)

Objective:-The primary objective of this course is to make students aware of the Principal Elements of Theravāda Buddhist Thought.

Learning Outcome: - Upon the completion of this course, students would able to have a clear understanding of Principal Elements of Theravāda Buddhist Thoughts along with their relevance in the Theravāda Buddhist Philosophy.

SYLLABUS OF DSC -4 -A4

Unit- I

Theravāda Etymology **8 Hours**

- Emergence of the term *Theravāda*
- *Theravāda as Vibhajjavāda*
- *Theravāda* Language, Literature and Region.

Unit- II

Basic Concepts of _Theravāda_ **15 Hours**

- *Ratanattayaṃ* and *Pañcasīla* and *Dasasikkhāpadaṃ*
- Nibbāna and its stages (Sotāpanna, Sakadāgāmi, Anāgāmi and Arahata)
- *Buddha, Pacceka Buddha and Arahata*

Unit- III

The Four Satipaṭṭhāna **12 Hours**

- Kāyānupassanā – Ānāpāna
- Vedanānupassanā
- Cittānupassanā
- Dhammānupassanā

Unit-IV

Concept of _Brahmavihāra_ in Theravāda Buddhism **10 Hours**

- Meaning of *Brahmavihāra* (Superior state of mind)
- Four supreme states of mind: *Mettā*, *Karunā*, *Muditā*, *Upekkhā*

Essential Readings:

- Gethin, R.M.L. 2001. *The Buddhist Path to Awakening*. Oxford: One world Publications.
- Maurice, Walshe. 1995. *The Long Discourses of the Buddha*. Boston: Wisdom Publications.
- Narada, Ven. 1998. *The Buddha and His Teachings*. Taipei: Buddha Educational Foundation.
- Śāstrī, Dvārikādāsa. 2009. *Dīghanikāyapāli. Bhāga-2*. Vārāṇasī: Bauddhabhāratī.
- Śharmā, Brahmadeva Nārāyaṇa. 2004. *Vibhajyavāda*. Vārāṇasī: Sampūrṇānanda Sanskrit Vishvavidyālaya.

Suggested Readings:

- Dutt, N. 1956. *Development of Buddhism in Uttara Pradesh*. Lucknow: Publication Bureau.
- Dutt, N. 1997. *Buddhist Sects*. Calcutta: Firma KLM (Pvt.) Ltd.
- Sangharakshit. 2006. *A Survey of Buddhism*. Delhi: Motilal Banarsidass.
- Shukla, H. S. (Ed.). 2001. *Aspects of Buddhism*. Varanasi: Banaras Hindu University.
- Walpola, Rahula. 2009. *What the Buddha Taught*. Taipei: The Corporate Body of the Buddha Educational Foundation. 1st Pub. 1978.

ANNEXURE-61

UNIVERSITY OF DELHI

Sub: Amendments to Ordinances/Regulations

The amendments to the Ordinances of the University consequent to following EC Resolutions are followed:

1. EC Resolution 47 of EC dated 08.12.2022 amendment in CAS 2018.
2. EC Resolution 14-1-16 dated 09.06.2023 qualifications, in Faculty of Technology, for Assistant Professor were adopted.
3. EC Resolution 20(15) dated 09.06.2023 qualifications for faculty of Education to incorporate qualifications of faculty for Integrated Teacher Education Programme (ITEP)
4. EC Resolution No 31-36 dated 25.08.2023 University Grants Commission (Minimum Qualifications for Appointment of Teachers and other Academic Staff in Universities and Colleges and Other Measures for the Maintenance of Standards in Higher Education) (2nd and 3rd Amendment) Regulations, 2023 issued in the Gazette of India dated July, 4, 2023 and August 1, 2023:

1. Amendments to Ordinance XXIV. Qualifications of University Teachers (Appointed and Recognised) (2nd Amendment)

Existing	Amended
GENERAL NOTE: (i) to (vii) xxx xxx xxx (viii) (a) to (c) xxx xxx xxx (d) The Ph.D. Degree shall be a mandatory qualification for direct recruitment to the post of Assistant Professor in Universities with effect from 01.07.2021.	**GENERAL NOTE:** (i) to(vii) xxx xxx xxx (viii) (a) to (c) xxx xxx xxx – No Change – (d) NET shall be the minimum criteria for the direct recruitment to the post of Assistant Professor.

2. Amendments to Ordinance XXIV. Qualifications of University Teachers (Appointed and Recognised) and Principals other than those for whom special qualifications may be prescribed by the Executive Council on the recommendations of the Academic Council. (2nd Amendment)

Existing	Amended
I. For the Disciplines of Arts, Commerce, Humanities, Law, Social Sciences, Sciences, Languages, Library Science, Journalism & Mass Communication and *Physical Education. **(a) Assistant Professor:** **Eligibility (A or B) :** **A.** 1) xxxx 2) xxxx *Provided* that the Ph.D. Degree shall be a mandatory qualification for direct recruitment to the post of Assistant Professor in Universities with effect from 01.07.2021. Or **B.** xxx xxx xxx	**I. For the Disciplines of Arts, Commerce, Humanities, Law, Social Sciences, Sciences, Languages, Library Science, Journalism & Mass Communication and *Physical Education.** **(a) Assistant Professor:** **Eligibility (A or B) :** **A.** 1) xxx xxx xxx 2) xxx xxx xxx *DELETED* Or **B.** xxx xxx xxx
III. Music, Performing Arts, Visual Arts and other Traditional Indian Art Forms like Sculpture, etc. **(a) Assistant Professor:** <u>Eligibility (A or B):</u> **A.** 1) xxxx 2) xxxx *Provided* that the Ph.D. Degree shall be a mandatory qualification for direct recruitment to the post of Assistant Professor in Universities with effect from 01.07.2021. Or **B.** xxx xxx xxx	**III. Music, Performing Arts, Visual Arts and other Traditional Indian Art Forms like Sculpture, etc.** **(a) Assistant Professor:** <u>Eligibility (A or B):</u> **A.** 1) xxx xxx xxx 2) xxx xxx xxx *DELETED* Or **B.** xxx xxx xxx

3. **Amendment to Ordinance XXIV. Qualifications of University Teachers (Appointed and Recognised) and Principals other than those for whom special qualifications may be prescribed by the Executive Council on the recommendations of the Academic Council.**

Existing	Amended
CAREER ADVANCEMENT SCHEME **Career Advancement Scheme – 2010 (CAS-2010)** 1. to 3. xxx xxx xxx **Provisions to deal with Pending Promotion Cases under the CAS 2010 as on 18.07.2018 in line with UGC Regulations 2018:** xxxx **Note:** (i) Xxxx (ii) The requirement for Orientation course and Refresher course for promotions due under the CAS shall not be mandatory upto December 31, 2018.	**CAREER ADVANCEMENT SCHEME** **Career Advancement Scheme – 2010 (CAS-2010)** 1. to 3. xxx xxx xxx **Provisions to deal with Pending Promotion Cases under the CAS 2010 as on 18.07.2018 in line with UGC Regulations 2018:** xxxx **Note:** (i) Xxxx (ii) The requirement for Orientation course and Refresher course for promotions due under the CAS shall not be mandatory upto December 31, 2023.
Career Advancement Scheme – 2018 (CAS-2018) The promotion of teachers and other academic staff of the University/Colleges shall be processed in accordance with the provisions of UGC Regulations 2018. The criteria for promotions under Career Advancement Scheme laid hereunder shall be effective from 18.07.2018. However, to avoid hardship to those faculty members who have already qualified or are likely to qualify shortly under CAS 2010, a choice may be given to them, for being considered for promotions under the same. This option can be exercised only within three years from 18.07.2018.	**Career Advancement Scheme – 2018 (CAS-2018)** The promotion of teachers and other academic staff of the University/Colleges shall be processed in accordance with the provisions of UGC Regulations 2018. The criteria for promotions under Career Advancement Scheme laid hereunder shall be effective from 18.07.2018. However, to avoid hardship to those faculty members who have already qualified or are likely to qualify within six months (Till 17th January, 2019) as per CAS 2010, a choice may be given to them, either for being considered for promotions under the CAS 2010 or 2018 Regulations. This option can be excercised only upto 31st

(i) to (vi) xxx xxx xxx (a) to (b) xxx xxx xxx (c)The candidate who does not succeed in the first assessment, she/he shall have to be re-assessed only after one year. When such a candidate succeeds in the eventual assessment, her/his promotion shall be deemed to be one year from the date of rejection. (i) xxx xxx xxx – No Change –	December 2023 and the date of eligibility shall be retained as the date of promotion. On the date of submission of application, the candidate should fulfil all eligibility criteria required for promotion. (i) to (vi) xxx xxx xxx (a) to (b) xxx xxx xxx (c) The candidate who does not succeed in the first assessment, she/he shall have to be re-assessed only after one year. When such a candidate succeeds in the eventual assessment, her/his promotion shall be effected either from 1st January or 1st July depending on the date of eventual assessment, as detailed below: If the eventual assessment is between 1st January and 30th June or a year, the promotion shall be granted from 1st July of the year. If the eventual assessment is between 1st July and 31st December of a year, the promotion shall be granted from 1st January of next year. Note : Date of rejection shall imply date of eligibility (i) xxx xxx xxx – No Change –
4. Screening cum evaluation committee: (Applicable for both CAS-2010 and CAS-2018) (i) Xxxx (ii) Xxxx	**4. Screening cum evaluation committee:** (Applicable for both CAS-2010 and CAS-2018) (i) Xxxx (ii) Xxxx <u>Add the following:-</u> NOTE: Date of rejection shall imply date of eligibility

4. Amendments to Ordinance XXIV. Qualifications of University Teachers (Appointed and Recognised) (E.C Res. No. 14-1-16 dated 09.06.2023)

Existing	Amended
IX. [308] TECHNOLOGY: **A. Assistant Professor- Technology** **i) Essential:** 1) First Class Master's Degree in the appropriate branch of Engineering & Technology. **ii) Without prejudice to the above, the following conditions may be considered desirable:** 1. Teaching, research industrial and / or professional experience in a reputed organization; 2. Papers presented at Conferences and / or in refereed journals.	IX. [308] TECHNOLOGY: **A. Assistant Professor:** **1. COMPUTER ENGINEERING** Essential Qualifications B.E./B.Tech./B.S. and M.E./ M.Tech./ M.S. or Integrated M.Tech. in relevant branch with first class or equivalent in any one of the degrees. 'OR' 1st class MCA and 1st class in M.Tech in relevant branch from a recognized University 'OR' 1st class or equivalent in B.E./B.Tech in relevant branch/1st class in MCA and Ph.D. in relevant branch from a recognized University. **2. ELECTRICAL ENGINEERING** Essential Qualifications: B.E./B.Tech./B.S. and M.E./M.Tech./M.S. or Integrated M.Tech. in relevant branch with first class or equivalent in any one of the degrees. 'OR' Ist Class or equivalent in B.E./B.Tech. in relevant branch and Ph.D. in relevant branch from a recognized University **3. ELECTRONICS & COMMUNICATION ENGINEERING** Essential Qualifications B.E./B.Tech./B.S. and M.E./M.Tech./M.S. or Integrated M.Tech. in relevant branch with first class or equivalent in any one of the degrees. 'OR' Ist class or equivalent in B.E./B.Tech. in relevant branch and Ph.D. in relevant branch from a recognized University

	Note: **(i) Annexure 1:** Details of branches relevant to Computer Science & Engineering, Electrical Engineering and Electronics & Communication Engineering **(ii) Annexure 2:** Procedure for Screening/ selection for direct recruitment
B. Associate Professor xxx xxx xxx **C. Professor** xxx xxx xxx	**B. Associate Professor** xxx xxx xxx **C. Professor** xxx xxx xxx

5. Amendments to Ordinance XXIV. Qualifications of University Teachers (Appointed and Recognised) (E.C Res. No. 20(15) dated 09.06.2023)

X. [309]EDUCATION: A. Assistant Professor in Education. 1. xxxx 2 xxxx Note: 1. For those subjects where the NCTE norms for qualifications for posts relating to B.El.Ed. stipulate only M.A./ M.Sc. and PG degree or research in Education, the minimum marks in that discipline should be 55% marks. 2. The National Eligibility Test (NET) shall be in Education for those positions where M.Ed. is a requirement. For those positions which do not require M.Ed., NET shall be in the subject concerned.	X. [309]EDUCATION: A. Assistant Professor in Education. 1. xxxx 2 xxxx **Add the following:** **3. For the discipline of Education (Integrated Teacher Education Programme):** **A. Assistant Professor: in Liberal Discipline and Pedagogy:** **1. Assistant Professor in Liberal Discipline and Pedagogy:** 1) Post-Graduate degree in Sciences (Physics or Chemistry or Botany or Zoology or Life Sciences or Bioscience) or Mathematics or Social Sciences (History or Geography or Political Science or Economics) or Languages (English or Modern Indian Languages or Classical Languages) or Commerce allied subjects with minimum fifty-five percent marks or its equivalent grade.

	2) B.Ed. degree with minimum fifty-five percent marks or its equivalent grade. 3) National Eligibility Test or Doctor of Philosophy in Education or in the concerned subject as prescribed by the University Grants Commission for these categories of posts. **Desirable:** 1) M.Ed. or M.Ed. with Specialisation 2) Ph.D. in Education **2. Assistant Professor in Educational Studies:** 1) Post Graduate degree in Education (M.Ed.) 2) With National Eligibility Test or Doctor of Philosophy in Education or in the concerned subject as prescribed by the University Grants Commission for these categories of posts. **Desirable:** 1) Master's degree in Psychology or Philosophy or Sociology or their allied subjects. Note: 1. For those subjects where the NCTE norms for qualifications for posts relating to B.El.Ed. stipulate only M.A./ M.Sc. and PG degree or research in Education, the minimum marks in that discipline should be 55% marks. 2. The National Eligibility Test (NET) shall be in Education for those positions where M.Ed. is a requirement. For those positions which do not require M.Ed., NET shall be in the subject concerned.
B. Associate Professor in Education. i) Master's Degree in Arts / Humanities / Sciences / Commerce with minimum 55% in	**B. Associate Professor:** **1. Associate Professor in Education.** i) Master's Degree in Arts / Humanities / Sciences / Commerce with minimum 55% in

the discipline relevant to the area of specialization. ii) Master's degree in Education (M.Ed./M.A. Education) with a minimum of 55% marks. iii) Ph.D. degree in Education or in the discipline relevant to the area of specialization. iv) Any other qualification prescribed by UGC like NET qualification or length of professional teaching experience as per UGC/University for the positions of Associate Professor.	the discipline relevant to the area of specialization. ii) Master's degree in Education (M.Ed./M.A. Education) with a minimum of 55% marks. iii) Ph.D. degree in Education or in the discipline relevant to the area of specialization. iv) Any other qualification prescribed by UGC like NET qualification or length of professional teaching experience as per UGC/University for the positions of Associate Professor. **2. For the discipline of Education (Integrated Teacher Education Programme):** 1) Postgraduate degree in Sciences or Mathematics or Social Sciences or Commerce or Languages. 2) M. Ed. 3) Ph.D, in Education. 4) Eight years of teaching experience in a teacher education institute for Associate Professor. 5) Any other relevant qualification prescribed by the UGC for these categories of posts.
C. Professor in Education. i) Master's Degree in Arts / Humanities / Sciences / Commerce with minimum 55% in the discipline relevant to the area of specialisation. ii) Master's degree in Education (M.Ed./M.A. Education) with a minimum of 55% marks. iii) Ph.D. degree in Education or in the discipline relevant to the area of specialization. iv) Any other qualification prescribed by UGC like NET qualification or length of professional teaching experience as per UGC/University for the positions of Professor.	**C. Professor:** 1. **Professor in Education.** i) Master's Degree in Arts / Humanities / Sciences / Commerce with minimum 55% in the discipline relevant to the area of specialisation. ii) Master's degree in Education (M.Ed./M.A. Education) with a minimum of 55% marks. iii) Ph.D. degree in Education or in the discipline relevant to the area of specialization. iv) Any other qualification prescribed by UGC like NET qualification or length of professional teaching experience as per UGC/University for the positions of Professor.

	2. For the discipline of Education (Integrated Teacher Education Programme): 1) Postgraduate degree in Sciences or Mathematics or Social Sciences or Commerce or Languages. 2) M. Ed. 3) Ph.D. in Education. 4) Ten years of teaching experience in a teacher education institute for Professor. 5) Any other relevant qualification prescribed by the UGC for these categories of posts.
D. Principal in a college exclusively offering M.Ed/B.Ed./B.El.Ed. Courses: xxxx	**D. Principal in a college exclusively offering M.Ed/B.Ed./B.El.Ed. Courses:** xxxx

Encl. as above:

IX. [308] TECHNOLOGY:

Annexure -1 (FOT)

1. COMPUTER ENGINEERING

Relevant Branch

- Advanced Communication and Information System
- Advanced Electronics & Communication Engineering
- Artificial Intelligence
- Computer and Communication Engineering
- Computer Applications
- Computer Engineering
- Computer Engineering & Applications
- Computer Networking
- Computer Science
- Computer Science & Engineering
- Computer Science & Information Technology
- Computer Technology & Applications
- Computer Science & Technology
- Computer Science and Systems Engineering
- Computer Technology
- Electrical & Electronics Engineering
- Electrical Engineering
- Electronic & Computer Engineering
- Electronic Engineering
- Electronics & Communication Engineering
- Electronics & Instrumentation
- Electronics & Telecommunication Engineering
- Information & Communication Technology
- Information Engineering
- Information Science & Engineering
- Information Science & Technology
- Information Security
- Information Systems
- Information Technology
- Information Technology & Engineering
- Mathematics & Computing

- Mobile & Pervasive Computing
- Software Engineering
- Software Systems
- Software Technology
- Software Testing
- VLSI Design
- Web Designing
- Web Technologies
- 3-D Animation & Graphics
- Applied Electronics and Instrumentation
- Microelectronics

2. ELECTRICAL ENGINEERING

Relevant Branch

- Electrical Engineering
- Electrical & Electronics Engineering
- Electronics Engineering
- Electronics & Communication Engineering
- Electronics and Electrical Communication Engineering
- Instrumentation & Control Engineering
- Control & Instrumentation
- Power Engineering
- Electronics & Applied Instrumentation Engineering
- Instrumentation Engineering
- High Voltage Engineering
- Electrical Machine & Drives
- Drive & Power Electronics
- Power Systems
- Power Electronics & Drives
- Power Apparatus & Systems
- Electrical Machines
- Power Apparatus & Electric Drives
- Systems and Control
- System Engineering
- Energy Systems
- Microwave &
  Optical Communication
- Communication Systems
- Signal Processing & Embedded System
- Process Control
- Control Engineering

- Measurement & Instrumentation
- Digital Design
- Microelectronics & VLSI Design
- RF and Microwave Engineering
- Telecommunication Systems Engineering
- Power and Energy Systems
- Machine Drives & Power Electronics
- Robotics System
- Communication Engineering
- Control and Computing
- Power Electronics & Power Systems
- Electronics Systems
- Power and Control
- Signal Processing
- Signal Processing & Digital Design
- Machine Drives & Power Electronics
- Power & Energy Systems Engineering
- Instrumentation & Signal processing
- Advance Communication and Information System
- Advanced Electrical Power System
- Advanced Electronics
- Advanced Electronics and Communication Engineering
- Applied Electronics
- Applied Electronics and Communications System
- Applied Instrumentation
- Automation and control
- Power Systems
- Bio Electronics
- Biomedical Electronics
- Biomedical Signal Processing and Instrumentation
- Communication Engineering and Signal Processing
- Computer Applications In Industrial Drives
- Control Engineering
- Digital Communication
- Digital Communication and Networking Digital Electronics
- Digital Electronics and Communication Engineering
- Digital Electronics and Engineering
- Digital Image processing
- Digital Instrumentation
- Digital Signal Processing
- Digital Systems
- Digital Systems and Communication
- Electric Power System

- Electrical Drive and Power Engineering
- Electrical and Power Engineering
- Electrical Energy Systems
- Electrical Engineering (Instrumentation &Control)
- Electrical Instrumentation and Control Engineering
- Electrical Power & Energy Systems
- Electrical Power Systems
- Electronics Circuits and System Design
- Electronics & Communication (VLSI Design)
- Electronics & Instrumentation Engineering
- Electronic & Tele communication Engineering
- Electronic and Control Systems
- Electronics and Telecommunication Engineering (Radio and Systems)
- Electronics Communication and Instrumentation Engineering
- Electronics
- Design and Technology Electronics Product Design and Technology
- Electronics Systems and Communication
- Electronics Technology
- Electronics Tele Communication
- Embedded and Real Time Systems
- Embedded Systems and VLSI Design
- Embedded Systems
- Embedded Systems Technologies.
- Energy Engineering
- Guidance and Navigation Control
- Guided Missiles
- High Voltage and Power System Engineering
- Illumination Engineering
- Illumination Technology & Design
- Image Processing
- Industrial Automation & RF
- Engineering
- Industrial drives and Control
- Industrial Electronics
- Industrial Power Control and Drives
- Instrumentation Engineering
- Integrated Circuits Technology
- Integrated Power Systems
- Micro and Nano Electronics
- Micro Electronics & VLSI deigns
- Micro Electronics and Control Systems
- Micro Electronics Engineering

- Microwave and Optical Communication Engineering
- Microwave and Communication Engineering
- Microwave and millimeter Engineering
- Microwave and Radar Engineering
- Microwave and TV Engineering
- Microwave Engineering
- Optics and Optoelectronics
- Optoelectronics & Communication
- Optoelectronics and Laser Technology
- Optoelectronics Engineering
- Power and Energy Engineering
- Power and Industrial Drives
- Power Control and drives
- Power Electronics and Control
- Power Electronics and Electrical Drives
- Power Electronics and Machine Drives
- Power Electronics and Systems
- Power Electronics Engineering
- Power Engineering and Energy Systems
- Power system and Control
- Power System and Control Automation
- Power System with Emphasis on H.V. Engineering
- Power Systems and Automation
- Power Systems and Power Electronics
- Power Systems Control and Automation Engineering
- Radio Physics and Electronics
- Reliability Engineering
- Renewable Energy
- Sensor Technology
- Signal Processing and Communication
- Solar Power Systems
- Telecommunication Engineering
- Telematics
- VLSI and Embedded Systems Design
- VLSI and Microelectronics
- VLSI Design
- VLSI Design and Embedded Systems
- VLSI Design and Signal Processing
- VLSI Design and Testing
- VLSI System Design
- VLSI Systems
- Applied electronics and Instrumentation Engineering
- Biomedical Engineering

- Biomedical Instrumentation
- Electrical and Electronics (Power System)
- Electrical and Instrumentation Engineering
- Electrical and Power Engineering
- Electrical Engineering (Electronics & Power)
- Electrical Engineering Industrial Control
- Electrical Instrumentation and Control Engineering
- Electrical, Electronics and Power
- Electronics Science and Engineering
- Electronic Instrumentation and Control Engineering
- Electronics & Telecommunication Engineering
- Electronics and Computer Engineering
- Electronics and Control Systems
- Electronics and Electrical Engineering
- Electronics and Power Engineering
- Electronics System Engineering
- Information Technology and Engineering
- Instrument Technology
- Instrumentation & Electronics
- Mechatronics Engineering
- Medical Electronics Engineering
- Power Electronics and Instrumentation Engineering
- Energy and Environment Management

3. ELECTRONICS & COMMUNICATION ENGINEERING

Relevant Branch

- Advanced Electronics
- Advanced Electronics and Communication Engineering
- Applied Electronics
- Applied Electronics & Instrumentation Engineering
- Applied Electronics And Communications
- Advanced Communication And Information System
- Advanced Computer Aided Design
- Biomedical Electronics
- Biomedical Signal Processing
- Computer Engineering
- Computer Engineering & Application

- Communication & Signal Processing Computer And Communication Engineering
- Computer Applications
- Computer Engineering
- Computer Engineering &Applications
- Computer Science & Engineering
- Computer Science & Technology Communication And Information Systems
- Communication And Networking
- Communication Engineering
- Communication Engineering And Signal Processing
- Communication Networks
- Communication Systems
- Digital Design
- Digital Electronics
- Digital Electronics & Microprocessor
- Digital Electronics And Communication
- Digital Electronics And Communication Engineering
- Digital Electronics And Communication Systems
- Digital Electronics Engineering
- Digital Image Processing
- Digital Signal Processing
- Digital Systems
- Digital Communication
- Digital Communication Engineering
- Digital Communications And Networking
- Digital Systems And Computer Electronics
- Electronic Engineering
- Electronics & Communication Engineering
- Electronics & Computer Science
- Electronics (Fiber Optics)
- Electronics (Robotics)
- Electronics And Biomedical Engineering
- Electronics And Communication Engineering (Microwaves)
- Electronics And Communications Engineering
- Electronics And Control Systems
- Electronics And Electrical Engineering
- Electronics And Electrical Communication Engineering
- Electronics And Telecommunications Engineering
- Electronics And Telematics Engineering
- Electronics Design Technology

- Electronics Engineering
- Electronics Engineering (Industry Integrated)
- Electronics Engineering (Micro Electronics)
- Electronics Engineering

(Specialization In Consumer Electronics)

- Electronics Engineering With Microprocessor
- Electrical Engineering
- Electronics System Engineering
- Electronics Technology Embedded System & Computing
- Embedded System And VLSI
- Embedded System And VLSI Design
- Embedded Systems
- Embedded Systems Technologies
- Image Processing
- Industrial Electronics
- Integrated Circuits Technology
- Integrated Electronics And Circuits IC Design
- Information Technology
- Information Science & Engineering
- Information Science & Technology
- Information Security
- Information Systems
- Information Technology &Engineering
- Mobile & Pervasive Computing
- Medical Electronics
- Medical Electronics Engineering
- Micro And Nano Electronics
- Micro Electronics
- Micro Electronics & VLSI Design
- Micro Electronics And Control Systems
- Micro Electronics Engineering
- Microelectronics & VLSI Design
- Mobile Technology
- Microwave & Optical Communication
- Microwave And Communication Engineering
- Microwave And Millimeter Engineering
- Microwave And Radar Engineering
- Microwave And TV Engineering
- Microwave Engineering
- Microwaves
- Microwave And Optical Communication
- Mobile Communication
- Mobile Communication And Network Technology

- Modern Communication Engineering
- Nano Science & Technology
- Nano Electronics
- Nano Technology
- Optics And Optoelectronics
- Opto Electronics & Communication Systems
- Optoelectronics & Communication
- Opto-Electronics Engineering
- Optoelectronics -Optical Communication
- Optical Communication
- Radar & Communication
- Radio Frequency And Microwave Engineering
- Radar And Satellite Communication
- Radio Physics And Electronics
- RF And Photonics
- Signal Processing
- Signal Processing and Digital Design
- Signal Processing And Communications
- Signal Processing And Embedded Systems
- Telecommunication Engineering
- VLSI
- VLSI Design
- VLSI And Embedded Systems
- VLSI And Embedded Systems Design
- VLSI And Microelectronics
- VLSI Design And Embedded Systems
- VLSI Design And Signal Processing
- VLSI Design And Testing
- VLSI System Design
- VLSI Systems
- VLSI Design Tools And Technology
- Wireless And Mobile Communications
- Wireless Sensor Networks
- Wireless Communication & Computing
- Wireless Communication Technology
- Wireless Communications
- Wireless Networks And Applications
- Instrumentation Engineering
- Instrumentation and Control Engineering
- Power Electronics

Notes:

1. Any deviation in the nomenclature of the relevant branches or degrees as mentioned above may also be considered by the University.
2. AMIE/IETE qualifications in relevant branches mentioned in the advertisement are also eligible.
3. B.Sc. (Engineering), B.E., B.Tech, B.S. (Four years) shall be considered as equivalent.
4. M.Sc. (Engineering), M.E., M.Tech, M.S. shall be considered as equivalent.
5. Selection Committee, may in cases of exceptional merit, recommend additional increments in case of higher qualifications, experience and academic achievements by the candidates.
6. Persons already in employment in Government Department/Autonomous Bodies/Universities under Central/State Government should apply through proper channel.
7. If a class/division is not awarded, minimum of 60% marks in aggregate shall be considered equivalent to first class/division.
8. In case, procedure for conversion of Grade Point to percentage of marks is mentioned on the degree itself, the same shall be applied or otherwise, Grade Point in 10 point scale system will be adopted and the Cumulative Grade Point Average will be converted into equivalent marks as below:-

“Percentage of marks=10 x CPGA”

Annexure- 2 (FOT)

I. Procedure for Screening/ selection for direct recruitment:

1. The applications received will be scrutinized as per the eligibility criteria notified in the advertisement by the University for respective discipline.
2. Status of a candidate in terms of his/her shortlisting shall be made available on the respective dashboard of the applicant on the website of the University i.e. www.du.ac.in.
3. The University shall conduct a screening test for short listing of candidates. The shortlisted candidates will make a presentation before a duly constituted committee by the Vice-Chancellor prior to appearing for interview before the Committee.
4. The screening test for the post of Assistant Professor will be based on prescribed syllabus of Graduate Aptitude Test for Engineering in the respective discipline available in the syllabus with the scheme of examination.
5. The date of Screening Test will be notified in due course of time. The candidates are advised to keep a watch on the University website for further updates.

II. EXEMPTION FROM SCREENING TEST

1. The exemption of screening test for the purpose of recruitment to the post of Assistant Professor is granted to the candidates having Ph.D degree in the relevant branch and:

1.1 the candidates has at-least one publication in Category I
or

1.1 the candidate has at-least two publications in Category II or
1.2 the candidate has at-least five publications in Category II and Category III taken together

2. The candidates granted exemption from screening test shall be called for interview over and above the criteria fixed for Screening Test.

3. The categories of publication are specified below:

- **CATEGORIES:**

CATEGORY I – OUTSTANDING RESEARCH PUBLICATION

The paper must be in a journal paper with impact factor at-least two, indexed in SCI/SSCI and published in the following

- Nature
- Science

The candidate must have major contribution either as a First author/Second author or Corresponding author.

CATEGORY II – PREMIER RESEARCH PUBLICATION

The paper must be a journal paper with impact factor at-least 3.0 for Institute of Electrical & Electronics Engineers (IEEE) Transactions and one for all others, indexed in SCI/SSCI or SCI expanded and published in the following:

1. Proceedings of Royal Society
2. American Mathematical Society
3. American Physical Society
4. American Society for Civil Engineers (ASCE)
5. American Society for Mechanical Engineers (ASME)
6. IEEE Transactions (TRIF > = 3.0)
7. Association for Computing Machinery (ACM) Transactions
8. Institute of Civil Engineering Publishing, London
9. Institute of Mechanical Engineering, London
10. American Society of Testing Materials (ASTM)
11. Nature Publishing Group

In addition to the above list, the SCI/SSCI or SCI expanded indexed journals with impact factor equal to or more than ten (10) will be counted in category II. The candidate must have major contribution on either as a First author/Second author or Corresponding author.

CATEGORY III – COMMENDABLE RESEARCH PUBLICATION

The paper must be a journal paper with impact factor at least one, indexed in SCI/SSCI or SCI expanded and published in the following:

1. IEEE Transactions (TRIF < 3)
2. IEEE Journals
3. Springer
4. Elsevier (Science Direct)
5. Oxford University Press

6. Pergamon-Elsevier Science Ltd
7. Cambridge University Press
8. Wiley- Blackwell
9. Blackwell Publishing
10. John Wiley & Sons
11. Institute of Engineering and Technology (IET)
12. Biomedical Central Ltd
13. MIT Press
14. Indiana University Press
15. American Meteorological Society
16. American Physiological Society
17. American Society of Microbiology
18. American Chemical Society
19. American Institute of Physics
20. IOP Publishing Ltd.
21. Massachusetts Medical Society
22. IOS Press
23. Princeton University Press
24. Society of Industrial and Applied Mathematics
25. Proceedings of National Academy of Science of the USA

In additions to the above, SCI/SSCI or SCI expanded indexed journals not included in the above list having impact factor equal to or more than five (5) shall be considered for Category III. The candidate must have major contribution either as a First author/Second author or Corresponding author.

4. The candidates who wish to be considered for exemption from screening test should mention the same in the online application form. In case the exemption is claimed, necessary documents in support of the claim should be uploaded with the online application form.

5. WEIGHTAGE IN SCREENING TEST

5.1 The candidates having Ph.D. Degree, who could not become eligible for exemption of screening test but have some good research papers as a First author/Second author or corresponding author will be given weightage of 2% of maximum marks of screening test for each research paper in category II/III for the post of Assistant Professor. However, the maximum weightage including all weightages will not exceed 5% of the maximum marks of the screening test. The candidate must have major contribution in so published papers either as a 1st author/2nd author or corresponding author in all the papers submitted for consideration of weightages.

5.2 CATEGORIES:

CATEGORY II – PREMIER RESEARCH PUBLICATION

The paper must be a journal paper with impact factor at-least three, indexed in SCI/SSCI or SCI expanded and published in the following:

1. Proceedings of Royal Society
2. American Mathematical Society
3. American Physical Society
4. American Society for Civil Engineers (ASCE)
5. American Society for Mechanical Engineers (ASME)
6. IEEE Transactions (TRIF >=3.0)
7. Association for Computing Machinery (ACM) Transactions
8. Institute of Civil Engineering Publishing, London
9. Institute of Mechanical Engineering, London
10. American Society of Testing Materials (ASTM)
11. Nature Publishing Group

In addition to the above list, the SCI/SSCI or SCI expanded indexed journals with impact factor equal to or more than ten (10) will be counted in category II. The candidate must have major contribution either as a First author/Second author or Corresponding author.

CATEGORY III - COMMENDABLE RESEARCH PUBLICATION

The paper must be a journal paper with impact factor at-least one, indexed in SCI/SSCI or SCI expanded and published in the following:

1. IEEE Transactions (TRIF<3)
2. IEEE Journals
3. Springer
4. Elsevier (Science Direct)
5. Oxford University Press
6. Pergamon-Elsevier Science Ltd
7. Cambridge University Press
8. Wiley- Blackwell
9. Blackwell Publishing
10. John Wiley & Sons
11. Institute of Engineering and Technology (IET)

12. Biomedical Central Ltd
13. MIT Press
14. Indiana University Press
15. American Meteorological Society
16. American Physiological Society
17. American Society of Microbiology
18. American Chemical Society
19. American Institute of Physics
20. IOP Publishing Ltd.
21. Massachusetts Medical Society
22. IOS Press
23. Princeton University Press
24. Society of Industrial and Applied Mathematics
25. Proceedings of National Academy of Science of the USA

In addition to the above, SCI/SSCI or SCI expanded indexed journals not included in the above list having impact factor equal to or more than five (5) shall be considered for Category III.
The candidate must have major contribution either as a First author/Second author or Corresponding author.

5.3 The candidates who wish to be considered for weightage in the screening test should mention the same in the online application form. In case the weightage in the screening test is claimed, necessary documents in support of the claim should be submitted alongwith the printout of the online application form.
5.4 The additional weightage granted to the applicants as stated in preceding paras shall be added to their respective score in the screening test for preparation of final merit test.
5.5 The candidates shortlisted from the screening test, as per the applicable criteria and those who have been exempted from the screening test shall be called for presentation and interview on the dates notified at the University website.
5.6 All communications shall be sent through e-mail on the registered email-Id's of the applicant.