

**SEMESTER VIII
INCLUSIVE EDUCATION**

CODE: 16CIED81

Credits: 3 (2L: 0.5T:0.5P)

Hours: 4/Week

Objectives: On completion of the course, the student-teachers will be able to

1. understand and list basic facts on Inclusive Education
2. identify children with diverse needs
3. locate the appropriate initiatives taken at the national level towards inclusion.
4. develop an inclusive curriculum
5. evaluate teacher preparation programme for Inclusive Education

UNIT-I: Introduction to Inclusive Education

Equity and Educational Policy: Equity- meaning and scope- Educational Policies and recommendations pertaining to Equity, Equal Educational Opportunity, and Inclusiveness – Inclusive Education: Definition – concept and importance of inclusive education – Historical perspectives on education of children with diverse needs – difference between special education, integrated education and inclusive education – advantages of inclusive education.

Children with Diverse Needs: Definition and Characteristics of children (hearing, visual and physically challenged) developmental disabilities (autism, cerebral palsy, learning disability) social and emotional problems, importance of early detection and functional assessment.

UNIT-II: Initiatives taken at National Level towards Inclusion

National level: University Education Commission (1949). The Indian Education Commission (1964-66). Integrated Education for Disabled Children (IEDC, 1974). National Policy on Education 1986 (POA, 1992). Rehabilitation Council of India Act, 1992, The Persons with Disabilities (Equal Opportunities, Protection of Rights and Full Participation) Act 1995, The National Trust for the welfare of persons with Autism, Cerebral Palsy, Mental Retardation and Multiple Disabilities Act 1999, Sarva Shiksha Abhiyan, RMSA, National Curriculum Framework, 2005, IEDSS-2009, RTE-2009, Right to persons with disability Bill 2012/2014.

UNIT-III: Inclusive Curriculum

Inclusive curriculum – meaning and characteristics – Teaching and learning environment with special reference to inclusive school – Guidelines for adaptation for teaching / practicing science, mathematics, social studies, languages, physical education, yoga, heritage, arts, theatre, drama etc in inclusive settings – Techniques and methods used for adaptation of content, laboratory skills and play material in inclusive classroom.

UNIT-IV: Teacher Preparation and Inclusive Education

Review existing educational programmes offered in secondary school (general and special education) – Skills and competencies of teachers and teacher educators for secondary education in inclusive settings – N.C.F. 2005 and curriculum for teacher preparation and transaction modes – Roles, responsibilities and professional ethics of an

inclusive education teacher and teacher educators – Evaluation and follow-up programmes for improvement of teacher preparation programmes in inclusive education.

Practicals:

1. Visits to a special school
2. Carrying out a case study in opportunity school for slow learners.
3. Preparation of Three teaching aids for differently abled children.

COURSE OUTCOME

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

- CO1: Explain the concept of inclusiveness.
- CO2: Differentiate the diverse needs of children.
- CO3: Evaluate the initiatives taken at national level towards inclusion.
- CO4: Schedule preparation for inclusive curriculum.
- CO5: Support the innovative ideas for implementing the curriculum.

References:

- Ainscow, M. (1999) understanding the development of inclusive schools, London: Falmer Press
- Berry, P. (1976). Language and Communication in the mentally handicapped, University Park Press, Baltimore.
- Booth, T., Nes, K., Stromstab, M. (2003). developing inclusive Teacher Education, London: Routledge Falmer.
- Clough, P. and Corbet, J. (200) Theories of inclusive education – a students’ guide, Paul Chapman Publishing Ltd.
- Deiner, P. L. (1993). Resources for teaching children with diverse abilities, Harcourt Brace College Publishers.
- Gunter, H (200) “Educational Leadership and diversity” Educational Management, Administration and leadership, special edition: diversity.
- Halsall, R. (Ed.). (1998) Teacher Research and School improvement. Open University Press
- Hegarty, S. and Mithu Alur (2002) Education and Children with special educational needs – segregation to inclusion. New Delhi: Sage Publication India Pvt. Ltd.
- Index of inclusion (2014) NCERT, New Delhi
- Jangira N.K and Mani, M.N.G (1990): Integrated education for visually handicapped, Gurgaon, Old Subjimandi, Academic Press
- Jangira, N.K. and Ahuja, A. (2002): Effective Teacher Training: Cooperative Learning Based Approach: National Publishing house 23 Daryaganj, New Delhi
- Jha. M. (2002) inclusive education for all: schools without walls, Heinemann educational publisher, multivista global ltd, Chennai
- Julka, A (2006). Inclusive children and youth with disabilities in education – a guide for practitioners NCERT, New Delhi
- Karantha, P. and Rozario, J. (2003). Learning disabilities in India, New Delhi: Sage Publication India Pvt. Ltd.

- Umadevi.M.R. (2101). Special education: A practical approach to education children with special needs, Neelkamal Publications Pvt, Ltd, New Delhi.
- University Grants Commission (India) Inclusive and Quality Expansion of Higher Education – XII Five Year Plan, 2012-17

SEMESTER – VIII

DRAMA AND ART IN EDUCATION

CODE: 16CIED82

Credits: 2 (1L: 0.5T:0.5P)

Hours: 3/Week

Objectives: On completion of the course student teachers will be able to

1. integrate Art with Education and become better communicator;
2. develop creative thinking through different Art forms;
3. understand that liberal arts help in making better professionals;
4. understand Art as a medium of education;
5. understand the role of Art medium of education;
6. develop student's ability for perception and reflection;
7. use Art as an alternative language to experience
8. communicate concepts in teaching-learning.

ACTIVITIES

1. Visit to any center of art (museums, art gallery or institutes of performing art like NCPA) and observe pieces of art/play, Group Discussion can be conducted on the observation highlight up the aesthetics in art.
2. Write an appreciation essay on the historical movements (sculpture, and agricultures) or any piece of art (music, dance, drama, painting)
3. Perform a drama or dance or music of local culture.
4. Prepare a project work on any contemporary thinkers like Rabinranath Tagore, Herbert Read, etc and their contribution to art field.
5. Prepare a file on different forms of bhārata nāṭyā mudras, bāvas, rasas.
6. Do a different variety of craft work on “origami”.

COURSE OUTCOME

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

- CO1: Adapt various cultural aspects through drama and art.
- CO2: Select art as an alternative language to experience
- CO3: Develop creative thinking through different art forms.
- CO4: Communicate concepts in teaching-learning.

CO5: Exhibit different variety of craft work on “origami”

References:

- Coomara Swamy, A.K. (1974). *Christian and Oriental Philosophy of Art*. New Delhi: MunshiramManoharlal.
- Esner Elliot, W. *Educating Artistic Vision*. New York: Macmillan Publishers.
- Herbert Reed. *Education through Art*. New York: Faber and Faber.
- Jefferson B. (1960). *Teaching Art to children- Continent View Point*. Boston: AllynBacon.
- John Dewey. *Art as Experience*. New York: Macmillan Publishers.
- John, B. and Chawla, R. (2007). *Playing for real: Using drama in the classroom*. MancmillanPublishers.
- Rabindranath Tagore .*Lectures and Address*, New Delhi: Macmillan Publishers.

SEMESTER-VIII
HUMAN RIGHTS AND DUTIES EDUCATION

CODE: 16CIED83

Credits: 2 (1L: 0.5T:0.5P)

Hours: 3/Week

Objectives: On completion of the course, the student-teachers will be able to

1. understand the concept, development and evolution of Human Rights and Duties
2. appreciate the role of society towards Human Rights and Duties
3. understand the constitutional provisions, Govt. policies etc. towards Human Rights and Duties
4. state and understand the different categories of population and their rights
5. realizes the trends and the importance of internationalizing Human Rights and Duties

UNIT-I: Human Rights and Duties - Concept, Development and Evolution.

- (1) **Sociology of Human Rights:** (a) Society and the individual, (b) Society and Groups, Socio-economic Justice, (c) Society and Societal Culture, (d) Society and the Process of Socialization.
- (2) **Rights and Duties:** Classifications of Rights and duties, Co-relation of rights and duties. Changing dimensions of human rights & duties.
- (3) Values, Dignity, Liberty, Equality, Justice, Unity & Diversity. Inherent, inalienable, universal and individual.
- (4) **Society and Human Rights : Promotion and Protection:** (a) Role of NGOs, (b) Role of Mass Media, (c) Role of Educational Institutions, (d) Role of Government, (c) Human Rights Education, (d) Social Movements

UNIT-II: Human Rights and Duties in India: Constitutional Framework

- (1) **Basic Features of the Constitution of India:** Fundamental Rights, Directive Principal of State Policy, Fundamental Duties - Protection & enforcement of human rights and duties: (a) Police and Human Rights, Judiciary and Human Rights, (b) National and State Human Rights Commission & other grievance redressal mechanism.
- (2) **Emerging Trends:** (a) Human Rights and Terrorism, (b) Human Rights and Environment. (c) Human Rights and Globalization.

UNIT-III: Human Rights of Special Category and Marginal Groups

- (1) **Rights of different categories of population:** (a) Rights of the Women, (b) Rights of the Children, (c) Rights of the Dalit and Tribes, (d) Rights of Minorities, (e) Rights of Old and Disabled, (d) Rights of unorganized Labour & Displaced Persons.
- (2) **Importance of internalizing human rights and duties:** Urgent need for not only sensitizing others of human rights and duties, but of practicing oneself those values: self-inculcation and endeavor to live up to those ideals - Duty to respect other's rights, respect each other's human dignity.

COURSE OUTCOME

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

CO1: Value the categories of population.

CO2: Appreciate the role of society towards Human Rights and Duties.

CO3: Implement the acquired knowledge in the appropriate situations.

CO4: Realizes the trends and the importance of internationalizing.

CO5: Understand the different categories of population and their rights.

Suggested Readings :

- Basu, Durga Das. (1994). Human Rights in Constitutional law. New Delhi: Prentice Hall.
- Baxi, Upendra. (2002). Future of Human Rights.
- Bueren, Geraldine Van. (1995). International Law on the Rights of the Child.
- Caney, Simon and Jones, Peter (eds.). (2001). Human Rights and Global Diversity.
- Freeman, Michael. (2002). Human Rights: An Interdisciplinary Approach.
- Gogia, S.P. (2000). Law relating to Human Rights.
- Gupta D.N. and Singh, Chandrachur. (2001). Human Rights and Freedom of Conscience: Some suggestions for its Development and Application.
- Iyer, Venkat (ed.). (2000). Democracy, Human Rights and the Rule of Law: Essayes in Honour of Nani Palkivala.
- Jhunjhunwala, Bharat (ed.). (2002). Governance and Human Rights.
- Nirmal, Chiranjivi J. (ed.). (2002). Human Rights in India: Historical, Social and Political Perspective.
- Paul, R.C. (2000). Situation of Human Rights in India.
- Peter, S.E. (1994). Human Rights: Perspective and Challenges. New Delhi: Lancers Books.
- Rai, Rahul. (2002). Monitoring International Human Rights.
- Rao, D. Bhaskar (ed.). (2003). Human Rights and the Constitution: Vision and the Reality.
- Saksena, K.P. (ed.), Human Rights and the Constitution: Vision and the Reality (2003)
- Sen, Sankar. (2002). Human Rights and Law Enforcement.
- Sinha, Manoj Kumar. (1999). Implementation of Basic Human Rights.
- Sreekumar, R. (2003). Handbook for Prison Visitors: Checking, Correcting and Preventing in Prisons.

Other Primary Sources:

- ILO, Comparative Analysis of the International covenants of on Human Rights and International
- ILO, Recommendations by the ILO of the World Conference on Human Rights: A Description of ILO Action on Human Rights, UN Doc. A/CONF. 57/PC16/Add 3.
- ILO. (1968). The ILO and Human Rights: Report of the Director-General (PartI), Geneva: International Labour Office.
- ILO. (1974). Migrant Workers. Geneva: International Labour Office.
- Labour Conventions and Recommendations. (1969). Official Bulletin (General), Vol. 52, No. 2, pp.181-216.

SEMESTER-VIII
GUIDANCE AND COUNSELLING

CODE: 16CIED8A

Credits: 2 (1L: 0.5T:0.5P)

Hours: 3/Week

Objectives: On completion of this course the student teacher will be able to

1. handle the subject area 'guidance and counselling' for student teachers.
2. offer educational, vocational, personal guidance and counseling to prospective teachers.
3. offer basic counseling to needy students.
4. equip student teachers with the skills to impart guidance to students at secondary and higher secondary level.
5. develop interest among student teachers to enter into the field of guidance and counseling
6. take initiative in planning and organizing various guidance services in educational institutions.
7. recognize the impact of new technology in guidance and counseling

UNIT-I: Introduction to Guidance Programme in Schools

Concept and definition of guidance. Scope and principles of guidance. General, individual and social needs of guidance . Common misconceptions about guidance. Objectives of guidance. Sociological and philosophical bases of guidance. Ethical considerations in guidance . Need for guidance at various levels education. Guidance as an integral part of Education. Integrating guidance with curriculum. School guidance : a team approach of school and community. Planning of guidance programme in schools – steps. Standardized and non-standardized techniques in guidance. Standardized – intelligence tests, aptitude tests, personality tests, interest inventory, achievement tests. Non – Standardized – questionnaire, observation, sociometry, rating scale, anecdotal records, cumulative record, case study, interviews.

UNIT-II: Guidance and its Dimensions

Types of guidance: Educational, vocational/career and personal guidance. Nature , need, scope and functions of Educational, vocational/career and personal guidance. How to impart Educational, vocational/career and personal guidance. Individual vs. group guidance : concept, advantages and limitations. Group guidance activities – class talks, career talks, career conferences, career- fair, socio drama, psycho drama and role play. Career development: concept, theories – Ginzberg and Super. Career development needs of students. Factors affecting career development.

UNIT-III: Understanding Counselling

Meaning, nature and scope of counseling. Basic principles of counseling. Counseling and related fields: psycho therapy, advice, instruction, guidance etc. Objectives of counseling. Approaches to Counselling: directive, non-directive and eclectic Counseling theories : behaviouristic, psycho analytic, humanistic, trait, factor. Individual vs. group counseling: concept, advantages and limitations. Stages of counseling process. Counseling techniques: Relaxation technique, Assertion training (social skills training) , Rational Emotive Behaviour Therapy, Systematic Desensitization. Roles and functions of Personnel involved in the counselling programme: in-school resources and out of school resources. Skills and qualities of an effective counselor. Specialized areas of

counseling: family counseling, career counseling, adolescent counseling, educational counseling, parental counseling, peer counseling. Counseling and Technology: tele counseling, internet counseling. Recent researches in the area of counseling.

COURSE OUTCOME

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

- CO1: Support the need for guidance at various levels of education.
- CO2: Examine the ethical considerations in guidance.
- CO3: Appraise the dimensions and factors affecting career development.
- CO4: Design counseling programme for school students.
- CO5: Provide positive platform for students under depression.

References

- Anastasi Anne (1982). Psychological testing, New York, Mac Millan
- Bhatnagar, Asha and Gupta, Nirmala (Eds)(1999) Guidance and Counselling A theoretical perspective, (Vol.I:) New Delhi: Vikas.
- Bhatnagar, Asha and Gupta, Nirmala (Eds)(1999) Guidance and Counselling (Vol.II) A practical approach, New Delhi: Vikas.
- Borders (1975)Counselling Programmes, London; Sage publications
- Corel,G.(2000). Theory and Practice of Group Counselling.
- Devu Indu (1984). The Basic Essentials of Counselling. New Delhi: Sterling Pvt. Ltd.
- Govt. of India, (1986).: National Policy on education. MHRD
- Govt. of India, (1992). Programme of Action. MHRD
- George, R.L. and Christiani, T.H.(1990). Counselling theory and practice (3rd edn.). New Jersey: Prentice Hall.
- Gibson, R.L.(2005). Introduction to Counselling and Guidance (6th edn.)New Delhi: Prentice hall of India.
- Jones, J.A.(1979). Principles of Guidance, New York:Mc Graw Hill.
- Kennedy ,E. and Charles, SC.(1997). On becoming a Counsellor: a basic guide for non professional counselors, New York: The Cross road Pub.Co.
- Kochar, S.K.(1980). Educational and Vocational Guidance in Secondary School. New Delhi: Sterling Pvt. Ltd.
- Manuel for Guidance Counsellor,NCERT,New Delhi.
- Mathewson, R.H.(1962). Guidance, policy and practice.
- Mohan, S. (1985). Readings for Career Teachers.
- Mohan, V.(1983). Counselling its concept its, principles and methods, Chandigarh: Common wealth youth programme.
- Nanda, S.K. and Sharma,S.(1992). Fundamentals of Guidance, Chandigarh.

SEMESTER – VIII COMMUNICATION SKILLS

CODE: 16CIED8B

Credits: 2 (1L: 0.5T:0.5P)

Hours: 3/Week

Objectives: On completion of the course, the student-teachers will be able to

1. acquires good pronunciation and fluency of speech.
2. understands the need for teaching of English as second language.
3. defines functions of language in the class rooms identify various speech defects in the class room.
4. understands the concepts of word formation.

Unit-I: Functions of Language and Lexis

Class-room discourse; nature, meaning and medium-Strategies for using oral language in the class-room- Functions of language in the class-room and outside the class-room - Speech defects- lisping, slurring, stuttering and stammering, and the role of a teacher in its resolution.

Word formation: Affixation, Conversion, Compounding-Clipping-Portmanteau – Onomatopoeia-Loan Words and other minor devices -Patterns of Spelling - Grammar Games-Phrasal Verbs and Prepositional Phrases-Sentence Connectors - Devices for Cohesion and Coherence - Common Idioms and phrases.

Unit -II: Development of communication skills

Listening: Sub skills of listening, importance of listening in English, approaches to develop aural-oral skill. Speaking: Sub skills of speaking, importance of speaking skill - Reading: Sub skills of reading, importance of oral and silent reading in English, Intensive, Extensive reading, Skimming, Scanning, methods of teaching oral reading, ways of developing reading - Writing: Components of writing, importance and Characteristics of good handwriting, ways of improving handwriting - Tasks for developing communication skills.

Unit-III: Fluency

Using the language laboratory to practice the following: Describing and interpreting pictures, models, tables, maps, etc., -Reading aloud prose passages and Poems -Telling stories and narrating incidents. -Use of conventional formulae (Greeting, apology, invitation, refusal, accepting, thanking, etc.) -Communication Games-Interviews-Extempore speeches on given topics, just –a- minute (JAM), Debates, Role play and dramatization

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

- CO1: Identify the speech disorders and find the solution.
- CO2: Implement the communication skill in the classroom activities.
- CO3: Develop their lexical formation.
- CO4: Design the language games and activities.
- CO5: Improve their Fluency in English language.

References:

- Allen & Pit Corder (eds.), 'Edinburgh Course in Applied Linguistics', Vol.3, (OUP), 1982.
- Bhatia K, 'Teaching of English', Tandon Publications, Ludhiana, 2000.
- Billows, 'The Technique of Language Teaching' (Longman), 1952 .
- Heaton J.B, 'Composition through Pictures' (Longman) 1952.
- Heaton J.B, 'Writing English Language Test', (Longman) 1952.
- Horsburgh,(1954). 'How to Use the Blackboard in Teaching English'. Orient Longman.
- Kohli A. L (2002). 'Teaching English in the New Millenium', Dhanpetrai Publishing Company, New Delhi.
- Krishnaswamy,(2000). 'Modern English, A Book of Grammar, Usage and Composition (Macrillag)
- Quirk and Greenbaum. (1950). 'A University Grammar of English (Longman), 1950.
- Willkins. (1962). 'Notional Syllabuses, (OUP) 1962.

SEMESTER – VIII
UNDERSTANDING THE SELF

CODE: 16CIED8C

Credits: 2 (1L: 0.5T:0.5P)

Hours: 3/Week

Objectives: On completion of the course student teachers will be able to

1. know thyself through self analysis;
2. change their negative thoughts into positive thoughts;
3. identify and manage emotions;
4. plan and manage time effectively;
5. gain the knowledge of the dreams and aspirations.

ACTIVITY : Self-Awareness and self Motivation

Exercise : Know Thyself through SWOT Analysis

ACTIVITY : Power of Positive thinking

Exercise : Exercises of Positive thinking

ACTIVITY : Emotional Intelligence

Exercise : Identifying and categorizing emotions

ACTIVITY : Time Management

Exercise : Strategy for using time effectively

ACTIVITY : Towards Empowerment

Exercise : My Dreams and Aspirations

COURSE OUTCOME

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

- CO1: Evaluate themselves through self-analysis.
- CO2: Change their negative thoughts into positive thoughts.
- CO3: Implement the acquired knowledge in the appropriate situations.
- CO4: Gain the knowledge of the dreams and aspirations.
- CO5: Identify the different categories of emotions.

References:

- Bos, (Ed.). (2012). *Critical Thinking, Academic Writing and Presentation Skills*. New Delhi: Oxford University Press.
- Dudley, G.A. (2004). *Double Your Learning Power* : Delhi:Konark Press. Thomas Publishing Group Ltd.
- Grellet, Françoise.(2007).*Developing Reading skills*. Cambridge: Cambridge University Press.
- Hedge, Tricia. (1998).*Writing*. Delhi: Oxford University Press.

- Hurlock, E.B. (2006). *Personality Development*. 28th reprint. New Delhi : Tata McGraw Hill.
- John Seely, (2004). *The Oxford guide to Writing and speaking*. New Delhi: Oxford University Press.
- Mile, D.J.(2004). *Power of Positive Thinking*. Delhi : Rohan Book Company.
- Pravesh Kumar, (2005). *All about Self-motivation*. New Delhi : Good will Publishing House.
- Raman, Meenakshi., and Sharma, Sangeeta. (2011). *Communication skills*. New Delhi: Oxford University Press.
- Swaminthan, V.D., and Kaliappan , K.V. (2001). *Psychology for Effective Living*. Chennai. The Madras Psychology Society.

SEMESTER-VIII
MATHEMATICS – PAPER - XII
MATHEMATICAL STATISTICS

CODE: 16EIED82

Credits: 3 (2L:1T:0P)
Hours: 4/Week

Objectives: To enable students to

1. understand the concepts of sampling, testing of hypothesis, critical region and standard error.
2. understand the significance of the connection between statistics and their applications to the real world.

UNIT – I: Random Variables:

Definition of a random variable , Definition of Discrete and Continuous Random Variable, Mathematical Expectation of Discrete And Continuous Random variable.

UNIT – II: Binomial, Poisson Distributions:

Definitions, mean, mode, recurrence formula for moments, fitting of distributions.

NORMAL DISTRIBUTION:

Definition, Limiting Form of Binomial Distribution, Chief characteristics of Normal distribution, Normal probability curve, mode, median, moment Generating functions, moments, Area property, Fitting of Normal distribution.

UNIT – III: Simple correlation – Pearsonian’s rank correlation – regression lines –

regression coefficients and its properties – computation of mean and variances and correlation coefficients from regression lines

UNIT – IV: Sampling theory – parameter and statistic – standard error – null and alternative

hypothesis – test of significance for large samples – test of significance for single proportion – difference of proportion – single mean – difference of means- difference of standard deviation

UNIT – V: Test of significance for small samples – tests for significance based on t-test, F-

test, chi-square distributions and its applications-test the goodness of fit – Independence of attributes.

COURSE OUTCOME

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

CO1: Explain the concept of random variable and mathematical expectation of a random variable

CO2: Appraise normal distribution and binomial distribution

CO3: Compare and contrast Pearson rank correlation and simple correlation

CO4: Relate the concept of statistics and their application to real life situations

CO5: Execute T-test and chi-square distributions for comparing the given data.

Reference Books:

- S.C. Gupta and V.K Kapoor, Fundamentals of Mathematical Statistics, Sultan Chand & Sons publications.
- S.P Gupta, Statistical Methods, Sultan Chand Publications.
- P.R. Vittal, Mathematical Statistics, Margham publications

SEMESTER-VIII
PHYSICS – PAPER - 9
ATOMIC, SOLID STATE & NUCLEAR PHYSICS

CODE: 16EIED81

Credits: 4 (3L:0T:1P)

Hours: 5/Week

Objectives: To enable students to

- study atom models and their importance.
- study crystal structure, bonding in crystals, specific heat and superconductivity.
- study the structure and models of nucleus and also to study the process of radioactivity and its applications and also.
- study the working of detectors, accelerators and cosmic rays.
- study the aspects related to elementary particle and space physics.

UNIT -I: Atomic Physics

Sommerfeld's relativistic atom model - vector atom model - quantum numbers associated with the vector atom model - coupling schemes - Pauli exclusion principle - periodic classification of elements - magnetic dipole moment (due to orbital motion of the electron and due to spin) - Stern and Gerlach experiment - spin orbit coupling - Optical spectra - Zeeman effect - Lorentz classical theory of normal effect, shift, experiment - Larmor's theorem – quantum mechanical explanation of the normal and anomalous effect -Paschen Back effect - Stark effect.

UNIT - II: Solid State Physics

Periodicity - Lattice, Basis, Unit cell, crystal structure - symmetry elements - 2D and 3D Bravais lattices - bonding in crystals - different types and their properties - band theory of solids - specific heat capacity: Einstein's theory and Debye's theory - Superconductivity - experimental facts – persistent current - Type I - Type II - Meissner effect - BCS theory - applications.

UNIT - III: Nucleus and Radioactivity

General properties - binding energy - nuclear stability - theories of nuclear composition - nuclear forces - models of nuclear structure - liquid drop model and shell model - Alpha particle spectra - Beta ray spectra - origin of the line and continuous spectrum - neutrino theory of beta decay - origin of gamma ray spectra - Nuclear isomerism- internal conversion - law of successive disintegration - radioactivity dating - Biological effect of nuclear radiations.

UNIT-IV: Particle Detectors, Accelerators and Cosmic Rays

Particle detectors - interaction between energetic particles and matter – Wilson Cloud chamber - Geiger Muller Counter - nuclear emulsion technique – Particle accelerators - Cyclotron - Betatron - Synchrotron - electron synchrotron and proton synchrotron - Discovery - Cosmic Rays - latitude, azimuth, altitude and longitude effects - primary and secondary cosmic rays – showers - positron - mesons - Van Allen belts - origin of cosmic rays.

UNIT-V: Elementary Particle Physics and Space Physics

Properties of elementary particles (Lepton & Baryon) - exact conservation laws - energy linear momentum angular momentum - charge - Baryon & Lepton number - origin of these laws - fundamental interactions – approximate conservation laws - strangeness - parity - charge conjugation - time reversal - Quark model - unification of interaction - geography of the universe - Hubble's law.

COURSE OUTCOME

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

- CO1: Distinguish the change in behaviour of atoms in external applied electric and magnetic field.
- CO2: Identify the lattice vibration phenomenon and thermal properties of solids.
- CO3: Develop the various types of nuclear detectors and accelerators.
- CO4: Apply the knowledge of nuclear fission and fusion reactions.
- CO5: Classify different kinds of interactions between elementary particles.

Reference Books

- R. Murugesan., Kiruthiga Sivapasath. Modern Physics, S. Chand &Co., Thirteenth Revised Multicoloured Edition, New Delhi, 2007.
- H.S Mani and G.K. Mehta, Introduction to Modern Physics, EW Press, New Delhi, 1988.
- Arthur Beiser, Concepts of Physics, Tata McGraw - Hill - Sixth Edition, 2003.
- Sehgal Chopra Sehgal - Modern Physics, Sultan Chand Sons, New Delhi, 2004.
- Sanjiv and Puri, Modern Physics Concepts and Application, Narosa Publication, New Delhi - 2004.

Physics Practicals – VIII
Paper – VIII

Any Seven Practicals

1. B.G comparison of EMF's & capacitance.
2. g-by fall plate.
3. A stable multivibrator.
4. Monostable & bistable multivibrator.
5. De Morgan's theorem and Boolean algebra.
6. Colpitts Oscillator.
7. Clipping and Clamping.
8. Kater's pendulum.
9. Frequency – Melde's apparatus.

SEMSTER-VIII
CHEMISTRY – PAPER-VIII
CHEMISTRY OF COORDINATION COMPLEXES

CODE: 16CIED84

Credits: 4 (2L: 1T: 1P)

Hours: 6/Week

Course objective: To learn about what is coordination chemistry, nomenclature and various theories: Werner theory, valence bond theory, crystal field theory and John-Teller theory.

Unit – I: Introduction

Nomenclature- Werner Theory- EAN Rule – Chelation- Stability of complexes – factors affecting the stability – Stepwise and overall formation constant Isomerism: structural isomerism- stereoisomerism – geometrical and optical isomerism in 4 and 6 coordinated Complexes

Unit – II: Theories of Coordination – I

Valence bond theory – shortcomings of VB theory – crystal field theory –CFSE – Spectrochemical series- colour and magnetic properties of complexes– high spin and low spin complexes Defects of CFT, Comparison of VBT and CFT

Unit – III: Theories of Coordination – II

Evidences of covalent bonding in metal – legend bonding Molecular Orbital theory of 6 bonded complexes only Jahn Teller effect and electronic spectra of complexes comparison of CFT and MOT

Unit – IV: Metal Carbonyls

Metallic carbonyls – Preparation – Reaction – Classifications Structure and Bonding in Carbonyls – Back bonding – Evidences for π - bonding – Applications of carbonyls Ferrocene – preparation – properties – Aromatic character of ferrocene – Structure.

Unit – V: Coordination complexes reaction and mechanisms

Liability and inertness of complexes – mechanism of acid hydrolysis and base hydrolysis of octahedral complexes – SN^1 , SN^2 and SN^1CB mechanisms – evidence for SN^1CB mechanism *trans* effect – trans effect series – Theories of trans effect – applications of trans effect.

COURSE OUTCOME)

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

- CO1: Appreciate the postulates of Werners theory of coordination compounds
- CO2: Understand the coordination Chemistry and nomenclature.
- CO3: Learn the rules of nomenclature of coordination compounds
- CO4: Identify different types of isomerism in coordination compounds

CO5: Understand the bonding in coordination compounds in terms of the valence Bond and crystal Field theories

Text Books:

- Puri B. R, Sharma L. R. Kalia K. K “Principles of inorganic Chemistry” Milestone publishers, 31st edition, **2013**.

Reference Books:

- P. L. Soni, “Text Book of Inorganic Chemistry” Sultan Chand & sons. 32nd edition. **2013**
- R. D. Madhan, “Modern Inorganic Chemistry” S. Chand & Co., 6th edition **2012**
- James E. Huheey, Ellen, A. Keiter, Richard, L. Keiter, “Inorganic Chemistry” Pearson education (Singapore Pvt Limited) 9th edition, **2013**.
- J. D.Lee, Concise Inorganic chemistry” Blackwell Science Limited (France) 9th edition **2013**
- F. A cotton G. Wilkinson and P. L. Gvas “Basic Inorganic Chemistry” John Wiley, 11th edition, **2009**.

**CHEMISTRY
PRACTICAL-VIII**

Organic Analysis:

Reaction of the following functional groups:

1. Aldehyde,
2. Ketone,
3. Carboxylic acid (mono and di),
4. Ester,
5. Carbohydrate (reducing and non reducing),
6. Phenol,
7. Aromatic primary amine,
8. Amide,
9. Nitro compound,
10. Diamide,
11. Anilide.

The given organic compound containing one functional group should be analyzed and to be reported with a characteristic derivative.

SEMSTER-VIII
CHEMISTRY – PAPER-IX
MAJOR-BASED ELECTIVE - I
ELECTRO CHEMISTRY AND SURFACE CHEMISTRY

CODE: 16CIED8D

Credits: 4 (2L: 1T: 1P)

Hours: 6/Week

Course objective: To have detailed knowledge about electrochemistry, theories of electrochemistry and surface chemistry.

Unit – I: Electrochemistry-I

Conductance - cell constant specific conductance and equivalent conductance measurement. Variations of equivalent conductance with concentration weak and strong electrolytes mobilities of ions - transport number Kohlraush's law. Applications of Ostwald dilution law - conductance -titrations (acid-base, precipitation) solubility product dissociation constant.

Unit – II: Electrochemistry-II

Potentiometry - cells electromotive force - electrode potential - their thermodynamic significance. Nernst equation standard electrode potentials and its determination. Reference electrodes hydrogen electrode calomel, quinhydrone and glass electrodes. Types of cells - chemical and concentration cell - liquid junction potential salt bridges. Redox systems.

Unit – III: Electrochemistry-III

Theory of indicators- pH Henderson equation - determination of pH by Potentiometry. Electrolytes - strong and weak-ionic equilibria - ionisation constant hydrolysis of salts-hydrolysis constant and its determination by potentiometry. Potentiometric titrations - acid-base, redox, precipitation.

Unit – IV: Surface Chemistry-I

Laws of photochemistry Grothaus Drapper law, Einstein's law of photochemical equivalence- quantum yield. Kinetics of photochemical reactions of CH_3CHO and $\text{H}_2 - \text{Cl}_2$. Photophysical processes fluorescence and phosphorescence – sensitisation chemiluminescence.

Unit – V: Surface Chemistry-II

Physisorption and chemisorption - adsorption isotherms - Freundlich and its use in surface area determination. Colloids-types, stability and electrical double layer, electrophoresis and electro-osmosis -association colloids (micelles) and critical micelle concentration.

COURSE OUTCOME

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

CO1: Value concept of specific conductance and equivalent conductance measurement

CO2: Prove the concept of applications of ostwald dilution law.

CO3: Understand the Nernst equation standard electrode potentials and its nature.

CO4: Examine the concept of various types of chemical and concentration cells photochemical equivalence

CO5: Evaluate the concept of photophysical processes and fluorescence.

Text Books:

- P.W. Atkins, "Physical Chemistry" Oxford publishers, 11th edition, **2009**
- B. R. Puri, L. R. Sharma, Pathania, "principle of Physical Chemistry" Vishal Publishing & Co., 46th edition **2013**

Reference Book:

- P.L. Soni, "Text Book of Physical Chemistry" Sultan Chand & sons. 12th edition, **2011**
 - Kundu and Jain, "Physical Chemistry" S. Chand, 6th edition, **2011**
 - S. Glasstone, "Text Book of Physical Chemistry" –Macmillan. 7th edition **2012**
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**CHEMISTRY
PRACTICAL-IX**

List of Experiments

1. Estimation of Barium as Barium Sulphate
2. Estimation of lead as lead chromate
3. Estimation of Lead as Lead sulphate
4. Estimation of nickel as Ni –DMG Complex

**SEMSTER-VIII
CHEMISTRY – PAPER-IX**

MAJOR-BASED ELECTIVE - II
ANALYTICAL TECHNIQUES IN CHEMISTRY

CODE: 16CIED8E

Credits: 4 (2L: 1T: 1P)

Hours: 6/Week

Course objective: To understand the basic concepts about errors and their minimization. Various practical's in chemistry with their concepts, instruments and their utility.

Unit – I: Titrimetric Methods of Analysis

Methods of expressing concentration of solutions. Types of titrations. Requirements for titrimetric analysis. Primary and secondary standards. Limitation of volumetric analysis. pH of strong and weak acid solutions. Buffer solutions. Henderson equations. Preparation of acidic and basic buffers. Relative strength of acids and bases from K_a and K_b values. Neutralisation-titration curve, theory and choice of indicators. Stability of complexes. Titration involving EDTA. Metal ion indicators and their characteristics.

Unit – II: Precipitation titrations and Gravimetric methods of analysis

Concept of sparingly soluble salts. Relation between solubility and solubility products. Argentometric titrations, indicators for precipitation titrations involving silver nitrate. Determination of chloride by Volhard's method. Adsorption indicators. Separation by precipitation. Factors affecting solubility, gravimetric factor. Purity of precipitates, von Weiman ratio. Co-precipitation and post precipitation. Precipitation from homogeneous solution.

Unit – III: Chromatographic techniques and applications

Principles of adsorption and partition chromatography: Column and Paper chromatography. TLC, ion-exchange chromatography - technique and applications. Gas chromatography, principle, detector and applications. Purification of solid organic compounds: recrystallisation, sublimation. Use of miscible solvents. Use of drying agents and their properties. Purification of liquids. Experimental techniques of distillation – fractional distillation – vacuum distillation – steam distillation.

Polarography and Thermal methods

Polarography - theory, apparatus, DME, Diffusion, Kinetic and catalytic currents, Current - voltage curves for reversible and irreversible system, qualitative and quantitative applications to inorganic systems. Amperometric titrations-theory, apparatus, types of titration curves, successive titrations and indicator electrodes – Applications. Principle of thermogravimetric analysis (TGA). Differential thermal analysis (DTA): Instrumentation and applications. Factors affecting TGA and DTA curves. TGA of $AgNO_3$, $CaC_2O_4 \cdot H_2O$ and DTA of sulphur.

Unit – IV: Microwave and IR Spectra

Basic principle of M.W. concept of selection rule Instrumentation. Basic principle of IR Spectra Region of IR spectra plotting methods sampling and functional technique concept of groupings FTIR.

UV visible and Mass Spectra

Lambert Beers law- Basic principle of UV visible Spectra and Woodward Fiesher rule
 Chromophores Auxo - chromes plotting methods of spectra-solvent effect.
 Basic principle of mass spectra and plotting methods fragmentation Pattern and methods
 base peak Molecular ion peak meta stable peak Nitrogen rule Mc lafferty rearrangement

Unit – V: NMR Spectra

Classification- atoms based on nuclear types nuclear moment principle of nuclear
 magnetic resonance -oscillating frequency larmour frequency-chemically and magnetic
 environments reference Nucleic plotting method chemical shift low resolution and high
 resolution spectra Spin-Spin coupling concept PMR C¹³, F¹⁵, P³⁵ FTNMR

COURSE OUTCOME

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

- CO1: Understand the theoretical principles classical analytical methods within titration.
- CO2: Analyze the various techniques within gravimetric and coulometric methods.
- CO3: Classify the various separation techniques in chromatography, and typical applications of chromatographic techniques.
- CO4: Examine the theory and working of polarography and its application in inorganic elements.
- CO5: Gain the idea about the basics and Merits of electro analytical techniques.

Text Books:

- B. K. Sharma. “Instrumental method of chemical analysis” Goel publishing house, 27th edition, **2011**.
- Grudeep R. Chatwal, Sham K. Anand. “ Instrumntal Methods of Chemical Analysis” Himalaya Publishing House, 5th edition, **2013**.
- B. K. Sharma. “Instrumental method of chemical analysis” Goel publishing house, 27th edition, **2011**.

Reference Books:

- Robert M. Silverstin, Clayton Bassler and Terence C. Morrill, “Spectrophotometer Identification of organic compounds” John Wiley Sons. 6th edition, **2009**.
- H. H. Willard, J. A. Dean, L.L. Merit “Instrumental method of chemical analysis” Words Worth, 7th edition, **1999**.
- Grudeep R. Chatwal, Sham K. Anand. “ Instrumntal Methods of Chemical Analysis” Himalaya Publishing House, 5th edition, **2013**.

CHEMISTRY PRACTICAL-X

1. Estimation of Sulphate as Barium Sulphate

2. Estimation of Chloride as Silver Chloride
3. Estimation of Calcium as Calcium oxalate monohydrate
4. Estimation of Magnesium as magnesium Oxinate
5. Estimation of Zinc as Zinc Oxinate
6. Estimation of Aluminium as Aluminium Oxinate
7. Estimation of Chromium as lead Chromate
8. Estimation of Magnesium as Magnesium pyrophosphate
