

SEMESTER – V

PLANNING FOR ASSESSMENT AND EVALUATION

CODE: 16CIED51

Credits: 4 (3L: 0.5T: 0.5P)

Hours: 5/Week

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

1. define the concepts related to educational measurement, assessment and evaluation.
2. explain and use the different types evaluation.
3. use taxonomy of Educational Objectives and develop skills of writing instructional objectives.
4. explain and use different types of tests to assess learning.
5. construct blue print and develop skills of planning and administering class room tests.

UNIT-I: Measurement and Evaluation

Meaning and definition of Measurement, Assessment and Evaluation. Relationship among Measurement Assessment and Evaluation. Need and importance, Principles – Uses of Evaluation.

UNIT-II: Types of Evaluation

Types of Evaluation — Internal and External, Formal and Informal, Continuous Comprehensive Evaluation, Formative and Summative, Norm Referenced and Criterion Referenced.

UNIT-III: Recent Reforms in Examination Practices

Innovative Examination Practices – Spot Valuation, Flying Squad, Dummy Numbers. Computerisation in Examination Practices – On line Examination and Publication of results. Credit system - Semester and Public examination – Choice Based Credit System (CBCS) – Continuous and Comprehensive Evaluation (CCE) - Open Book Examinations.

UNIT-IV: Educational and Psychological Tests

Tests – Purpose – Objectives– need and Importance of conducting different types of tests - Achievement test, Diagnosis test, Prognostic test, Intelligence test, Aptitude test, Attitude test and Personality test. Testing Methods – Oral, Written and Performance Test.

UNIT V - Planning for Constructing Achievement Tests

Various types of test items – Objective type test items - Completion, Matching, Two Choice, Multiple Choice and others - Subjective type test items – Essay and Short Answer - Question Bank. Steps in test construction – Table of specifications, Blue Print – Item Writing – Revising Items - Scoring – Marking, Grading - Item Analysis– Interpretation and Follow Up. Characteristics of a good measuring instrument – validity, reliability, feasibility and objectivity.

COURSE OUTCOME

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

- CO1:** Use different types of test to assess learning
- CO2:** Appraise the concept related to educational measurement
- CO3:** Use different types of evaluation.
- CO4:** Construct blueprint and administering classroom test.
- CO5:** Differentiate the various types of Evaluation.

References:

- Agarwal, J.C. (2009). Essentials of Educational System, Vikas Publishers House Pvt Ltd, New Delhi.
- Bhattia, K.K. (2008). Measurement & Evaluation in Education, Tandon Publications, Ludhiana.
- George, David. (2008). Trends in Measurement & Evaluation techniques, Common Wealth Publishers, New Delhi.
- Goswami, Marami. (2011). Measurement & Evaluation in Psychology and Education, Neelkamal Publication, New Delhi.
- Linn, Robert L. (2008). Measurement & Assessment in Teaching, Dorling Kunderslay, New Delhi.
- Mangal, S.K. (2009). Statistics in Psychology and Education, PHI Learning Pvt Ltd, New Delhi.
- Metha, D.D. (2006). Educational Measurement & Evaluation, Tandon Publications, Ludhiyana.
- Mrunalini, T. (2010). Educational Evaluation, Neelkamal Publications, New Delhi.
- Sidhu, K.S. (2007). New approaches to measurement & Evaluation, Sterling Publishers Pvt Ltd, New Delhi.
- Singh, Raj, (2008). Techniques of Measurement & Evaluation, Common Wealth Publishers, New Delhi.
- Smith, D. (2007). History of Measurement & Evaluation, Common Wealth Publishers, New Delhi.
- Smith, D. (2008). Theory of Educational Measurement, Common Wealth Publishers, New Delhi.
- Walton, John.A. (2008). Educational Objectives & Achievement testing, Common Wealth Publishers, New Delhi.

SEMESTER – V
PEDAGOGY OF PHYSICAL SCIENCE – P1

CODE: 16CIED52

Credits: 4 (3L: 0.5T: 0.5P)

Hours: 5/Week

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

1. know the nature and scope of Physical Science;
2. understand the aims and objectives of teaching Physical Science;
3. list and classify the diversified needs of students;
4. explain the methods of teaching Physical Science;
5. understand and identify various teaching aids;
6. implement the knowledge of Learner Controlled Instruction, Co operative and Collaborative Learning effectively for better curriculum transaction.

UNIT-I: Nature and Scope of Physical Science

Science as a product and a process: a body of knowledge, a way of investigation, a way of thinking – Characteristics of a person with scientific attitude – Interdisciplinary Approach- Implications of the nature of Science for a Science teacher.

UNIT-II: Objectives of Teaching Physical Science and Teaching skills

Need and significance of teaching Physical Science -Aims: practical, social, disciplinary and cultural - Teaching objectives: General Learning Outcomes(G.L.O's) and behavioral or Specific Learning Outcomes (S.L.O's) relating to the cognitive, affective and psychomotor domain based on Taxonomy of Educational Objectives, Anderson revised taxonomy. Teaching skills: Micro teaching: Origin, Need, Phases, Definition, Characteristics, Process, Cycle, A Plan of action, Advantage of Micro teaching and its Uses-Skills : Explaining, Questioning , Blackboard usage, probing question, Reinforcement, Stimulus variation -Link lesson.

UNIT-III: Methods of Teaching Physical Science

Teacher and Student centered Methods- Lecture method- Lecture Demonstration method- Heuristic method- Project method- Biographical method- Inductive-deductive method- Historical method-Assignment method- Significance of employing different methods in teaching of Physical Science.

UNIT-IV: Teaching Aids

Concept of Teaching Aids- Importance of using aids in the teaching of Physical Science- Edgar Dale's Cone of Experience- Principles for selection of Teaching Aids- Classification of Teaching Aids- Visual Aids- Chalkboard, Bulletin Board, Flannel Board, Chart, Flash Cards, Posters, Models, Specimens, Objects, Diorama, Graphs, Filmstrip Projector, Slide Projector, Epidiascope, Overhead Projector- Audio Aids- Radio, Tape Recorder, Audio-Visual Aids- Television, Computer, Documentaries, Motion Pictures – Criteria for selection of appropriate teaching aids.

UNIT-V: Exploring learner

Focusing on Interest, Attitudes, and Motivation of students. Developing listening, and questioning skill among teachers and students. Negotiating with learner's meaning- initial assessment (Entry behavior)- methods of negotiations- process of negotiating goals and targets- advantages of negotiation. Exit behavior. Grouping students based on ability. Individual

difference – meaning, identification of gifted and slow learner. Enrichment and remedial teaching methods for differently abled students. Activities to enrich physical science learning – Techniques to tackle individually different students: Assistive learning, supplementary text material, summer programmes, correspondence course.

COURSE OUTCOME

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

- CO1: Classify the diversified needs of learners
- CO2: Adopt the methods of teaching physical science
- CO3: Identify and use the various teaching aids.
- CO4: Implement the Learner controlled instructions.
- CO5: Explore the innovative technologies in teaching learning process.

References:

- Anderson, R.D et. al.(1992). *Issues of Curriculum Reform in Science, Mathematics and Higher Order Thinking- Across the Disciplines- The Curriculum Reform Project*. U.S.A.: University of Colorado.
- Carin., & Sund.R. (1989). *Teaching Modern Science*.U.S.A : Merrill Publishing Co.
- Chauhan, S.S. (1985). *Innovation in Teaching and Learning Process*. New Delhi: Vikas Publishing House.
- Gupta,S.K.(1985). *Training of Physical Science in Secondary Schools*. New Delhi: Sterling Publication (Pvt) Limited.
- Harms, N., & Yager, R. (1981). *What Research Says to the Science Teacher? Vol. 3*, U.S.A: National Science Teachers Association.
- Heiss, Oboum., & Hoffman.(1961).*Modern Science Teaching*. New York: Macmillan & Co, Limited.
- Husen, T., & Keeves, J.P., (Ed.). (1991). *Issues in Science Education*. London: Pergamon Press.
- Jenkins, E.W. (2000). *Innovations in Science and Technology Education. Vol. VII*, Paris: UNESCO.
- Joseph.(1966). *The Teaching of Science*. London: Harvard University Press.
- Khana, S.D., Sexena, V.R. Lamba, T.P., & Murthy, V. (1976). *Technology of Teaching*. Doaba Publishing House.
- Mangal S.K., & Uma Mangal. (1999). *Essentials of Educational Technology*. New Delhi: PHI Learning (P) Ltd.
- Natrajan,C. (Ed.). (1997). *Activity Based Foundation Course on Science Technology and Society*. Mumbai: HomiBhaba Centre for Science Education.
- Nayak. (2003). *Teaching of Physics*. New Delhi: APH Publications.
- Owen, C.B. (1966). *Method of Science Mastery*. English Language Society and Macmillan Company Limited.
- Pandey. (2003). *Major Issues in Science Teaching*. New Delhi: Sumit Publications.
- Paneerselvam, A., & Rajendiran,K. (2005). *Teaching of Physical Science*. Chennai: Shantha Publication.
- PanneerSelvam, A. (1976). *Teaching of Physical Science (Tamil)*. Chennai: Government

of Tamil Nadu.

- Doals House.
- SonikaRajan. (2012). *Methodology of Teaching Science*.New Delhi:Dorling Kindersley (India) Pvt.Ltd.
- Thurber,W.A., &Collette,A.T.(1964). *Teaching Science in Today's Secondary School*. NewDelhi: Prentice Hall of India Private Limited.
- Williams, B., (1999). *Internet for Teachers*. London: John Wiley & Sons.
- Yadav, M.S. (2003). *Teaching of Science*. New Delhi: Anmol Publications.

SEMESTER – V
PEDAGOGY OF MATHEMATICS – P1

CODE: 16EIED51

Credits: 4 (3L: 0.5T: 0.5P)

Hours: 5/Week

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

1. understand the nature and scope of Mathematics.
2. comprehend the aims and objectives of teaching Mathematics;
3. explore different methods of teaching and learning in Mathematics;
4. recognise different approaches and strategies in teaching and learning of mathematical concepts;
5. organise various learning resources;
6. integrate the knowledge of Instruction (Teacher Controlled, Learner Controlled and Group Controlled) effectively for better curriculum transaction.

UNIT-I: Nature and Scope of Mathematics

Meaning, Definition and Scope of Mathematics - Importance of learning Mathematics -Structure, Abstractness, Symbolism, Precision - Mathematics as a science of measurement and quantification - Aesthetic sense in Mathematics - Mathematics and its relationship with other disciplines.

UNIT-II: Objectives of Teaching Mathematics and Teaching skills

Need and significance of teaching Mathematics -Aims: practical, social, disciplinary and cultural - Teaching objectives: General Learning Outcomes(G.L.O's) and behavioral or Specific Learning Outcomes (S.L.O's) relating to the cognitive, affective and psychomotor domain based on Taxonomy of Educational Objectives-Anderson revised taxonomy. Teaching skills: Micro teaching: Origin, Need, Phases, Definition, Characteristics, Process, Cycle, A Plan of action, Advantage of Micro teaching and its Uses-Skills : Explaining, Questioning , Blackboard usage, probing question, Reinforcement, Stimulus variation -Link lesson.

UNIT-III: Methods of Teaching in Mathematics

Inductive, Deductive, Analytic, Synthetic, Heuristic, Project, Problem solving and laboratory methods of teaching mathematics- Activity Based Learning (ABL)- Simplified Active Learning Methods (SALM)- Applications of ABL and SALM- Format of a typical lesson plan based on SALM- Introduction; Evocation, Recall, Survey- Understanding; Concept, Teacher and Individual solving Problem-Group Work, Presentation-Evaluation: Reinforcement, Homework, Remedial measures.

UNIT-IV: Teaching Aids in Mathematics

Edgar dale's cone of experience - Instructional material or teaching aids employed in Mathematics teaching : Blackboard of Chalk Board, Bulletin Board, Flannel Board, pictures, Graphs, Charts, Diagrams, Photographs, Cartoons, Posters, Flash cards, Newspapers, Models, Dioramas, Slides, Filmstrips, Transparencies, Scrap Book, Epidiascope, Projectors Radio, Tape Recorder, Television, Closed Circuit Television (CCTV), Video Tape or Cassette Recorder (VCR), DVD, MP-3VCD, Motion Pictures and Computers. Importance of TLMs in classroom

transaction - No cost and low cost materials- Contextual and local-specific TLMs - Collection, preparation, storing and use of TLMs.

UNIT-V: Exploring learners

Focusing on Interest, Attitudes, and Motivation of students. Developing listening, and questioning skill among teachers and students. Negotiating with learner's meaning- initial assessment (Entry behavior)- methods of negotiations- process of negotiating goals and targets- advantages of negotiation. Exit behavior. Grouping students based on ability: Individual difference – meaning, identification of gifted and slow learner. Enrichment and remedial teaching methods for differently able students. Activities to enrich mathematics learning – Techniques to tackle individually different students: Assistive learning, supplementary text material, summer programmes, correspondence course.

COURSE OUTCOME

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

- CO1: Classify the diversified needs of learners
- CO2: Adopt the methods of teaching Mathematics.
- CO3: Identify and use the various teaching aids.
- CO4: Implement the Learner controlled instructions.
- CO5: Explore the innovative technologies in teaching learning process.

References:

- Aggarwal, J.C. (2008). *Teaching of Mathematics*. Uttar Pradesh: Vikas publishing House Pvt Ltd.
- Bagyanathan, D. (2007). *Teaching of Mathematics*. Chennai: Tamil Nadu Text Book Society.
- Bhatia, K.K. (2001). *Foundations of Teaching Learning Process*. Ludhiana: Tandon Publication.
- Bishop, G.D. (1965). *Teaching Mathematics in Secondary School*. London: Collins publication.
- Bolt, B. (2003). *Mathematical Pandora's box*. New Delhi: Cambridge University press.
- Boyer, Carl B. (1969). *A History of Mathematics*. New York: Wiley Publications.
- Butter, C.H. (1965). *The Teaching of Secondary Mathematics*. London: McGraw Hill book company.
- Driscoll, M. (1999). *Fostering Algebraic Thinking: A Guide for teachers, grades 5-10*. Portsmouth, NH: Heinemann Publications.
- Ediger, M., & Bhaskara Rao, D.B. (2004). *Teaching Mathematics Successfully*. New Delhi: Discovery Publishing House.
- Goel, Amit. (2006). *Learn and Teach Mathematics*. Delhi: Authors press.
- Grouws, D.A. (1992). *Handbook of Research on Mathematics Teaching and Learning*. New York: Macmillan Publishing.
- Gupta H.N., & Shankaran V. (1984). *Content cum Methodology of Teaching Mathematics*. New Delhi: NCERT.
- Høglum, L. (1967). *Mathematics for the Million*. London: Pan Books Limited.

- Iyengar, K.N. (1964). *Teaching of Mathematics*. New Delhi: A Universal Publication.
- James, Anice. (2005). *Teaching of Mathematics*. New Delhi: Neelkamal Publication.
- Joyce, well.(2004). *Models of Teaching*. London: Prentice hall of India.
- Kapur S.K. (2005). *Learn and Teach Vedic Mathematics*. New Delhi: Lotus Publication.
- Kulshreshtha, *Teaching of Mathematics*. London: R. Lal and Sons.
- Kumar Sudhir, *Teaching of Mathematics*. New Delhi: Anmol Publications.
- Land, F.W.(1966). *New approaches to Mathematics Teaching*. New Delhi: MacMillan and St.Martin's press. .
- Mangal S.K. (2013). *Teaching of Mathematics*. Ludhiana: Tandon publications.
- Mangal, S.K., & Mangal, S. (2005). *Essentials of Educational Technology and Management*. Meerut: Loyal book depot.
- Muijs, Daniel., & Reynolds, David. (2005). *Effective Teaching: Evidence and Practice*. London: Sage Publication.
- Nickson, Marilyn. (2000). *Teaching and Learning Mathematics: A Guide to Recent Research and Its Applications*. New York: Continuum Press.
- Nunes, T., & Bryant, P. ((1997). *Learning and Teaching Mathematics: An International Perspective*. London: Psychology Press.
- Parthasarathy, N. (1961). *Kanitham Karpithal*. Chennai: The South India Saiva Sidhantha works. .
- Pratap, N. (2008). *Teaching of Mathematics*. Meerut: R.Lall Books depot.
- Schwartz, James E. (1994). *Essentials of Classroom Teaching Elementary Mathematics*. London: Allyn and Bacon Publication.
- Sharan, R., & Sharma, M. (2006). *Teaching of Mathematics*, New Delhi: APH Publishing Corporation.
- Sharma, R.A. (2008). *Technological Foundations of Education*. Meerut: R.Lall Books Depot.
- Siddizui, M.H. (2005). *Teaching of Mathematics*. New Delhi: APH Publishing Corporation.
- Sidhu, K.S. (2006). *Teaching of Mathematics*. New Delhi: Sterling Publishers private limited.
- Singh, M. (2006). *Modern Teaching of Mathematics*. New Delhi: Anmol Publications Pvt. Ltd.

SEMESTER-V

MATHEMATICS – PAPER - VIII
VECTOR CALCULUS AND GEOMETRY

CODE: 16EIED53

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

Objectives: To enable students to

1. learn the topic on vector calculus
2. understand the fundamental concepts of vector calculus and polar co-ordinate geometry
3. apply the knowledge of polar co-ordinate gained, to solve various problems
4. apply the various techniques of vector integration in solving volume and surface integrals

UNIT – I : Vector Differentiation: Directional Derivative, Unit normal to the surface, equation of tangent plane to a surface, equation of normal to a surface , Divergence, Curl, Laplace operators

UNIT – II: Evaluation of line integral, surface integral and volume integral

UNIT – III: Application of Green’s theorem, Gauss-Divergence theorem, Stokes theorem (proofs of theorems not included), simple problems

UNIT-IV: Polar co-ordinates: Distance between the points, area of triangles-equation of straight line, circle and Conic

UNIT-V: Planes: General Equation of a plane, Angle between two planes, to find the equation of the plane which bisects the angle between two given planes, Condition for a homogeneous equation of the second degree to represent a pair of planes, simple problems.

COURSE OUTCOME

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

CO1: Derive the equations of normal to a surface, curve and laplace operators

CO2: Understands the fundamental concepts vector calculus and polar geometry

CO3: Evaluate line integrals and surface integrals

CO4: Apply Green’s theorems, Gauss divergence and stokes theorem

CO5: Explain the concepts of general equation of the plane and angle between the planes

Reference Books:

- P. Duraipandian & Laxmi Duraipandian, Vector Analysis, Emerald Publisher.
- T.K. Manicavachagam Pillay&others, Revised edition, Reprint 2001, Analytical Geometry of two dimensions, S. Vishwanathan Printers and publishers pvt.ltd, Chennai
- P.R. Vittal, Vector analysis, Analytical solid geometry and sequences and series.

SEMESTER-V
MAJOR-BASED ELECTIVE - I
MATHEMATICS – PAPER - IX
OPERATIONS RESEARCH

CODE: 16EIED5A

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

Objectives: To enable students to

1. develop computational skills
2. develop logical thinking in formulating industry oriented problems
3. apply these techniques in real life situations

UNIT – I: Linear programming: General LPP- Mathematical formulation-Solution for LPP by Graphical Method and Simplex Method (finite optimal solution, unbounded solution, alternative optimal solution)- slack and surplus variables – solution for LPP with unrestricted variables

UNIT – II: Artificial Variable Technique- Big-M Method (Charner’s Penalty Method) – concept of Duality- Dual theorem only statement- Reading solution from the dual from the final simplex table of the primal and vice-versa

UNIT – III: Transportation problem-Assignment problem.

UNIT – IV: Sequencing Problem – n jobs through 2 machines-n jobs through 3 machines- two jobs and m machines; Game Theory – Two-person zero-sum game with saddle point-without saddle point-dominance property-solving 2 x n or m x 2 game by graphical method.

UNIT – V: PERT & CPM - Project network diagram & its rules-Fulkerson’s rule-time estimate and critical path in network analysis – floats - forward pass and back pass computations. PERT – optimistic time-most likely time-pessimistic time- expected duration and variance-difference between PERT and CPM. .

COURSE OUTCOME

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

CO1: Develop computational skills in solving linear programming problem

CO2: Understands the concepts of dual simplex method

CO3: Solve transportation and assignment problems

CO4: Explains the concept of Game theory and saddle point

CO5: Implement the techniques of PERT and CPM in real life situations

Reference Books:

- R.K. Gupta, Operations Research, 12th edition, Krishna Prakash
- Gupta P.K & Hira D.S (2000) Problems in Operations Research, S.Chand & Co, Delhi
- S.D. Sharma, Operations Research, 8th edition , Kedhar Nath Ram Nath & co, Meerut
- Taha , 6th Edition, Operation Research, Printice Hall, New Delhi
- V.Sundaresan, K.S. Ganapathy Subramanian, & K.Ganesan, Resource Management Techniques (Operations Research), Reprint June 2002, A.R. Publications, Nagapattinum District
- Prem Kumar Gupta , D,S, Hira , Operations Research,S,Chand & Company Ltd, Delhi

SEMESTER-V**MAJOR-BASED ELECTIVE - II
MATHEMATICS – PAPER - IX
DISCRETE MATHEMATICS**

CODE: 16EIED5B

**Credits: 3 (2L:1T:0P)
Hours: 4/Week****Objectives: To enable students to**

1. develop construction and verification of mathematical logic.
2. gain fundamental knowledge about lattices and Boolean Algebra.
3. learn the basics of Graph Theory and its application.

UNIT – I: PROPOSITIONAL CALCULUS

Tautology and contradiction – Equivalence of formulae -duality law – Tautological implications - Normal forms – disjunctive normal forms – conjunctive normal forms.

UNIT – II :LATTICES

Lattices - Introduction – Principle of duality - Properties of Lattices – sub Lattice –distributive Lattice modular lattices – bounded lattice - complemented lattice.

UNIT – III: BOOLEAN ALGEBRA

Definition – Other basic laws of Boolean Algebra – Principle of duality for Boolean Algebras – ATOM definition - ATOMIC Boolean algebra – Finite Boolean Algebra. Boolean expression – definition – Boolean function – Literal – minterm and maxterm, Normal forms and Canonical forms.

UNIT –**IV: GRAPHS, SUBGRAPHS AND CONNECTEDNESS**

Introduction – definition and examples – degrees – subgraphs – Isomorphisms – walks, trails and paths – connectedness and components – blocks – connectivity.

UNIT – V: EULERIAN AND HAMILTONIAN GRAPHS

Introduction - Eulerian graphs – Hamiltonian graphs.

COURSE OUTCOME

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

CO1: Explain the Relation, Functions, Composition of functions

CO2: Construct the truth table and explain the proof, reasoning

CO3: Proof of the theorems are explained in Groups, Abelian Groups, Monoids, Semi groups and few problems are discussed

CO4: Explain the mathematical reasoning and proof in automata theory.

CO5: Solving abilities with an emphasis on proof

Reference Books:

- Dr. S.P. Rajagopalan, Dr.R. Sattanathan, Discrete Mathematics, Margham Publications, Chennai -17.
- S.Arumugam, S.Ramachandran: Invitation to graph theory, Scitech Publications (India) Pvt.ltd, Chennai -17.
- Trembley J.P and Manohar .R , “Discrete Mathematical Structures with Applications to Computer Science”, Tata Mcgraw – Hill Publication Co., limited, New Delhi, 2003.
- Ralph.P. Grimaldi, “ Discrete and Combinatorial Mathematics: An Applied Introduction” 4th edition, Pearson Education Asia, Delhi 2002.

SEMESTER-V
PHYSICS – PAPER - 5
DIGITAL ELECTRONICS AND MICROPROCESSOR

CODE: 16EIED52

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

Hours: 5/Week

Objectives: To enable students to

- Study various number systems and to simplify Boolean expression using the methods of Boolean Algebra and Karnaugh map.
- know the fixed function Combinational logical circuits and their implementation.
- study the fundamentals and applications of sequential logical circuits.
- study the fundamentals of architecture and instruction set of an 8-bit microprocessor.
- write Assembly Language Programs for an 8-bit microprocessor INTEL- 8085.

UNIT I : Number Systems, Logic Gates & Boolean Algebra and K-MAPS

Number Systems and Logic Gates: Different Number Systems -Binary, Octal and Hexa-decimal. Conversion between the number systems. Different Digital codes - ASCII, BCD, Gray codes. Basic logic gates: AND, OR and NOT Gates. Realization using Diodes and Transistor. Universal gates - NAND, NOR - conversion into Basic gates, Special Gates - Ex-OR, Ex-NOR. Boolean algebra and K-Maps:- Boolean Laws. De-Morgan's Theorems. Simplification of Logical expression using Boolean Algebra. Fundamental Products. Minterms and Maxterms. Implementation of a Truth Table into an Equivalent Logic Circuit by Boolean Algebra and Karnaugh Maps – 4 Variables.

UNIT II: Combinational and Arithmetic Digital Circuits and Semiconductor Memories

Data processing circuits :- A basic study of TTL, CMOS and MOSFET- Classification and parameters. Basic Idea of Multiplexers 2:1, 4: 1, Demultiplexers 1:2, 1:4, Decoders, Encoders - decimal - to - BCD, Parity Generator and Checker - odd & even. Arithmetic Circuits :- Binary Addition, Binary Subtraction using 2's Complement Method, Half Adders, Half subtractors, Full Adders and Full Subtractors. Memories :- Read-only memories (ROM), PROM, EPROM and RAM.

UNIT III: Sequential Circuits

Sequential Circuits :- RS, D, JK and T Flip-Flops. Level Clocked and Edge Triggered Flip-Flops. Preset and Clear Operations. Race-around Conditions in JK Flip-Flops. Master-Slave JK Flip-Flop (As Building Block of Sequential Circuits). Counters : - Asynchronous and Synchronous Counters. Decade Counter, UP-DOWN Counters, Ring Counter. Shift registers : - Serial-in-Serial-out, Serial-in-Parallel-out, Parallel-in-Serialout and Parallel-in-Parallel-out Shift Registers (only upto 4 bits).

UNIT IV: Microprocessors

Intel 8085 Microprocessor Architecture Architecture of 8085. Block Diagram, different blocks, Buses, Registers, ALU, Memory- Stack Memory. Interfacing Devices, Timing and Control Circuitry, Pin-out Diagram. Timing States, Instruction Cycle , Interrupts and Interrupt Control, Input/Output. Machine Language. Assembly Language. Instruction Set and Format. Data Transfer, Arithmetic, Logical, Branching and Machine Control Operations. RIM and SIM. Different Addressing Modes : Register, Implied, Immediate, Direct and Indirect. Memory Organization and Addressing, Memory Interfacing, Memory Map.

UNIT V : 8085 Instruction Set and Programming

Microprocessor Programming :- Algorithm and Flowcharts. Simple programming Exercises : Addition - sum of two 8-bit data without carry, sum of two 8-bit data with carry, decimal addition, sum of a string of data, Subtraction of two 8-bit data, 8 bit Multiplication - using successive addition and 8 bit Division - using successive subtraction, Look-up-table, Masking of a data, block transfer.

COURSE OUTCOME

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

- CO1: Understand various number systems and simplify Boolean expressions.
- CO2: Analyze the logical circuits and their implementation.
- CO3: Compare the fundamentals and applications of sequential circuits.
- CO4: Assess the fundamentals of architecture and instruction set of an 8-bit microprocessor.
- CO5: Create language programs for an 8-bit microprocessor INTEL-8085

Reference Books

- Microprocessor Architecture, Programming, and Applications with the 8085 by Ramesh S. Gaonkar, (Prentice Hall, 2002).
- Microprocessor Architecture, Programming, and Systems featuring the 8085 by William A. Rott, (Thomson Delmar Learning, 2006).
- Digital principles and Applications by Donald P. Leach & Albert Paul Malvino, (Glencoe, 1995).
- Digital Fundamentals, 3rd Edition by Thomas L. Floyd (Universal Book Stall, India, 1998).

Physics Practicals – V

Paper – V

Any Seven Practicals

1. Semiconductor - Laser
2. Potentiometer – EmF of a thermocouple.
3. Zener regulated power supply.
4. B.G – L by Anderson bridge.
5. Fresnel's biprism.
6. Transistor characteristics – CB mode.
7. Transistor characteristics – CE mode.
8. FET characteristics.
9. Study of FET amplifier.

SEMSTER-V
CHEMISTRY – PAPER-V
SOLID STATE CHEMISTRY

CODE: 16CIED53

Credits: 4 (3L: 0T: 1P)
Hours: 5/Week

Course objective: To learn about nuclear components, nuclear energy, forces, nuclear reactors, nuclear power projects in India and various countries and to understand solid structure, crystals types, X-ray diffraction, semi conductors and solid defects

Unit – I: Introduction

The nucleus – subatomic particles- nuclear force- mass defect- packing fraction – Binding energy - n/p ratios in stable and metastable nuclei –Nuclear shell model the liquid drop model –nuclear isomerism- isotopes, isobars, isotones – mirror nuclei magic numbers

Unit – II: Fragmentation and assay

Nuclear fission – fission fragments and their mass distribution – fission energy – Theory of fission Nuclear reactors – Fast Breeder reactors - atomic power projects in India Nuclear fusion – Nuclear fusion in Sun's atmosphere Detection and determination of activity by G.M counter and Scintillation counter.

Unit –III: Tracer techniques

Radioactive Tracers: - Principles of separation of isotopes- uses in analytical chemistry, reaction mechanism and agriculture – radio carbon dating
 Artificial radioactivity- Transmutation of elements – cyclotron – induced radioactivity- Q values of nuclear reactions.

Unit – IV: Solid state I

Crystalline and amorphous solids- Elements of symmetry of a crystal – unit cell – Bravais lattices – miller indices – Bragg's law - X- ray diffraction of crystals – structure of NaCl, CsCl diamond, Graphite zinc and Futile – radius ratio rule

Unit – V: Solid state II

Defects in solids-Band Theory – Semiconductors – p-type and n- type semiconductors – applications – Solid state electrolytes- Types of magnetic behaviour – Dia, Para, Ferro, Antiferro and ferrimagnetism.

COURSE OUTCOME

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

- CO1: Define Atomic nucleus, Isotopes, Types of isotopes and Nuclear isomers
- CO2: Classify different types of Nuclear reactions, stability of Nucleus, Nuclear forces and Emission of alpha, beta, and gamma rays
- CO3: Analyze radioactivity, Nuclear fission, Nuclear fusion, Nuclear reactors, and breeder reactors
- CO4: Clarify about rate of radioactive decay, half-life period and activity of Radioactive substance

CO5: Describe general characteristics of solid state.

Text Books:

- Antony R. West, "Solid State Chemistry" Wiley edition, 7th edition, **2011**
- H. J Arnikar: "Essentials of nuclear Chemistry" New Age International Pvt. Limited. 5th edition, **2014**

Reference Books:

- R. Gopalan, "Elements of nuclear Chemistry" S. Viswanathan & Co., 7th edition, **2009**.
- A. F. Wells "Structural Inorganic Chemistry" Oxford University Press, 11th edition, **2009**.
- Phillips F. C. "An introduction to crystallography" Longmans Green, New York., 7th edition, **2012**

**CHEMISTRY
PRACTICAL-V**

1. Preparation of Ferrous ammonium sulphate.
2. Preparation of tetraamminecopper(II) sulphate.
3. Preparation of potassium trioxalatoluminate.
4. Preparation of potassium trioxalatochromate
