SEMESTER – VI
EDUCATIONAL MEASUREMENT

CODE: 16CIED61 **Credits: 2 (1L: 0.5T: 0.5P)**
Hours: 3/week

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

1. use different techniques and tools of evaluation.
2. understand the recent trends in examination practices.
3. construct different types of graphs and diagrams.
4. compute measures of central tendency and variation and interpret the results.
5. calculate correlation coefficient and interpret the results.
6. conduct action research

UNIT-I: Tools of Evaluation

Techniques of evaluation – Observation, Interview, Case study, Anecdotal record, Cumulative Record and Socio-metric technique. Check list, Rating scale – different types – errors in rating, Questionnaire

UNIT-II: Statistical Measures, Graphical Representations and measures of correlation

Organisation of Data into Frequency Distribution - Measures of Central Tendency – Arithmetic Mean, Median, Mode – Use and Interpretation - Measures of Variability – Range, Standard Deviation, Average Deviation and Quartile Deviation - Use and Interpretation. - Graphical Representation of Data and their uses: Bar Diagram, Histogram, Frequency Polygon, Cumulative Frequency Graph (Ogive). Correlation – Meaning and Types of Correlation - Interpretation of Co-efficient of Correlation – Rank Difference Method and Product Moment Method, Scatter Plot.

UNIT-III: Action Research and Programme Evaluation

Types of Research – Basic, Applied and Action Research. Action Research: meaning, scope and importance – Steps – Advantages and Limitations. Programme Evaluation: Programme – meaning, scope and importance – Planning for a Programme – Executing the Programme – Evaluating the Programme – Suggesting Steps for improvement.

COURSE OUTCOME

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

CO1: Appraise different types of Evaluation.

CO2: Experiment Statistical Measures and Interpret.

CO3: Examine the values with graphical representation.

CO4: Execute action research and program evaluation.

CO5: Measure the student's ability with their performance in academics.

References:

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- 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 Kuderslay, 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.

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SEMESTER – VI
PEDAGOGY OF PHYSICAL SCIENCE – P2

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

Hours: 5/Week

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

1. classify the co-curricular activities in Physical Science;
2. explain the process of evaluation in Physical Science;
3. recognize the significance of planning and teaching Physical Science;
4. explain the importance of classroom climate and acquire the skill of managing the classroom effectively;
5. integrate the picture of an ideal Physical Science teacher;
6. understand the organization of the school plant.

UNIT-I: Evaluation in Physical Science

Concept of Evaluation- Purpose of Evaluation- Continuous and Comprehensive Evaluation- Formative and Summative Evaluation- Achievement tests- Steps in construction- Preparation of Blue print- Preparation of an Achievement Tests in Physical Science - Administering the test- Various types of Test items- Essay type, Short answer type, Objective type: Completion type, Matching type, Multiple Choice- Merits and limitations of Essay, Short answer and Objective type-Item Analysis-Diagnostic Tests- Steps in constructing a Diagnostic test- Teacher made test- Standardized tests.

UNIT-II: Planning and Teaching

Significance of planning for effective teaching- Year Plan: importance and mode of planning- Unit Plan: definition, characteristics, steps in unit planning, importance of unit planning- Lesson Plan: definition, criteria of a good lesson plan, steps involved in lesson planning (Herbartian Steps), advantages of lesson planning.

UNIT-III: Teacher Professionalization and Teacher Commitment

Committed teachers, passionate teachers: Dimension of passion associated with teacher commitment and engagement: Teacher commitment as a passion- teacher – teacher commitment as a unit of time outside the contact hours with students- teacher commitment as focus on the individual needs of students. Teacher commitment as responsibility to impart knowledge, attitudes, values and beliefs- teacher commitment as maintaining ' Professional knowledge'- teacher commitment as engagement with school and community- importance of teacher commitment for quality enhancement – ways and means of enhancing teacher commitment for teaching professionalization. Academic and Professional Qualifications for a Science teacher- Qualities of a good Science Teacher- Need for Pre-service and In-service training- Professional development of Science Teachers.

UNIT–IV: Teaching and Learning Difficulties

Individual Differences, Language Problem in Learning , problems in providing laboratory equipments to students expectations, Nature of Subjects, Examination and Grading System

–Difficulties in establishing a culture of evidence, Teaching and Learning Styles – Classroom behaviour of Teacher and Learner – Importance of Effective Instruction.

UNIT-V: ICT and Cybernetics in Education

ICT meaning- growth and origin of ICT - traditional and modern ICT, application of ICT in teaching. Cybernetics- meaning- definition- theory and mechanism- use in the development of instrumental design- application in Physical Science Education- advantages and disadvantages.

COURSE OUTCOME

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

CO1: Classify the co-curricular activities in Physical science.

CO2: Analyze the significance of planning and teaching Physical Science.

CO3: Develop the skill of managing the classroom effectively.

CO4: Integrate the picture of an ideal Physical Science teacher.

CO5: Understand the organization of the school plant.

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 : Merill Publishing Co.
- Chauhan, S.S. (1985). *Innovation in Teaching and Learning Process*. New Delhi: Vikas Publishing House.
- Falvery, P., Holbrook, J.,& Conian, D. (1994). *Assessing Students.* Hongkong: Longman Publications.
- 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.
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- Paneerselvam, A., & Rajendiran,K. (2005). *Teaching of Physical Science*. Chennai: Shantha Publication.
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- Popham, W.J. (2010). *Classroom Assessment: What teachers need to know (6th ed.)*. New York: Prentice Hall.
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- Sampath,K.(1981). *Introduction to Education Technology*. Sterling Publishers.
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- Sharma, R.C. (2009). *Modern Science Teaching*. Meerut: Dhanpat Rai and Sons.
- Siddiqui & Siddiqui. (1985).*Teaching of Science Today and Tomorrow*. New Delhi: 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.

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SEMESTER – VI
PEDAGOGY OF MATHEMATICS – P2

CODE: 16EIED61 **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 importance of non- scholastic activities in Mathematics;
2. develop the knowledge of process of evaluation;
3. develop competence writing lesson plan and in teaching mathematics;
4. develop the professional growth and commitment to profession of teaching
5. understand the importance of classroom climate
6. acquire the skill of managing classroom effectively
7. develop the skill and competencies to maintain records.

UNIT-I: Evaluation of Mathematics Learning

Assessment of Mathematics Learning – Developing blue-print for designing question paper, item construction, marking schemes, question - wise analysis, framing of questions based on concepts and sub-concepts so as to encourage critical thinking, promote logical reasoning and to discourage mechanical manipulation of rote learning, framing of open ended questions providing the scope to learning to give *responses* in their own words, framing of conceptual questions from simple questions.

UNIT -II: Planning for Teaching-Learning Mathematics

Macro teaching - Lesson Plan, Unit Plan, Year plan - Herbartian steps - Format of a typical lesson plan – G.I.O's & S.I.O's - Teaching aids - Motivation, Presentation, Application, Recapitulation and Assignment

UNIT-III: Teacher Professionalization and Teacher Commitment

Committed teachers, passionate teachers: Dimension of passion associated with teacher commitment and engagement: Teacher commitment as a passion- teacher – teacher commitment as a unit of time outside the contact hours with students- teacher commitment as a focus on the individual needs of students. Teacher commitment as a responsibility to impart knowledge, attitudes, values and beliefs- teacher commitment as maintaining ' Professional knowledge'- teacher commitment as engagement with school and community- importance of teacher commitment for quality enhancement – ways and means of enhancing teacher commitment for teaching professionalization. Qualities and skills of mathematics teachers – General qualities, personal qualities and specific qualities.

UNIT-IV: Teaching and Learning Difficulties

Individual Differences, Language Problem In Learning - Nature of subjects, Examination and grading system - Teaching and Learning styles - Classroom behaviour of Teacher and Learner - Difficulties in Learning Mathematics: Dyscalculia - Mathematics Phobia - Dysgraphia - Mathematics Anxiety - Difficulties in handling mathematical instrument - Causes, Problems and its remedial measures .

UNIT-V: ICT and Cybernetics in Education

ICT meaning- growth and origin of ICT - traditional and modern ICT - application of ICT in –teaching. Cybernetics- meaning- definition- theory and mechanism- use in the development of instrumental design- its application in Mathematics education- advantages and limitations.

COURSE OUTCOME

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

CO1: Classify the co-curricular activities in Mathematics.

CO2: Recognize the significance of planning and teaching Mathematics.

CO3: Interpret the importance of classroom climate and acquire the skill of managing the classroom effectively in co-operative schools.

CO4: Integrate the picture of an ideal Physical Science teacher.

CO5: Understand the organization of the school plant.

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.
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- Muijs, Daniel.,& Reynolds, David. (2005). *Effective Teaching: Evidence and Practice.*London: Sage Publication.
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- 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.

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SEMESTER-VI

MATHEMATICS – PAPER - X

COMPLEX ANALYSIS

CODE: 16EIED63 **Credits: 3 (2L:1T:0P)**
HOURS: 4/Week

Objectives: To enable students to

1. apply modern treatment of concepts and techniques of Complex Function Theory.
2. understand methods to solve problems in pure as well as in Applied Mathematics**.**
3. learn complex number system, complex function and complex integration.

UNIT – I: Analytic function: functions of complex variables – Limit continuity – Uniform continuity – Analytic function – C-R equation**.**

UNIT – II: Bilinear transformation – Definitions – Definition of Conformal Mapping – Necessary and sufficient condition for conformal mapping – The transformations $w = az + b$, $w = 1/z$, $w = z^2$

UNIT – III : Complex Integration: Rectifiable arcs, Contour's – complex line integration – Cauchy's theorem, Cauchy – Goursat theorem (statement only) – Cauchy's Integral formula - Cauchy's integral formula for first order derivative – Cauchy's formula for higher order derivatives (without proof).

UNIT – IV: Taylor's and Laurents's Series (statement only), Residue Calculus – Zeros and Poles of a function – Meromorphic function – The Residue at a pole – Residue Theorem – Argument principle – Rouche's Theorem (simple problems)

UNIT – V: Contour integration, Evaluation of

i) $\int f(\cos\theta , \sin\theta)\, d\theta$

ii) $\int f\, dx$ where f(x) is a rational polynomial having no poles on the Real Axis

iii) $\int f(x) \cos mx\, dx$, where $m > 0$ and f(x) is a rational function having no poles on the Real Axis.

COURSE OUTCOME

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

CO1: Understand the C- R equations and analytic functions

CO2: Solve problems using Taylors and Lawrence series

CO3: Differtiate bilinear transformation and conformal transformation

CO4: Derive Cauchy's theorem and couch's integral formula

CO5: Prove the concept of contour integrations.

Recommended Books:

- R.V. Churchill and J.W Browm (1990), Complex variable and application (5th edition) McGraw Hill International Book Co., New York.
- T.K. Manickavachagom Pillay, Dr. S.P. Rajagopalan, Dr. R. Sattanathan (2011), Complex Analysis, S. Viswanathan (Printers and Publishers), Pvt.Ltd.
- P. Duraipandian & Laxmi Duraipandian, Complex Analysis, Emerald Publisher, Chennai – 2. 1997.

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SEMESTER-VI
PHYSICS – PAPER - 6
OPTICS, SPECTROSCOPY AND LASER

CODE: 16EIED62 **Credits: 4 (3L:0T:1P)**
Hours: 5/Week

Objectives: To enable students to

- understand the concepts of Dispersion of Light , interference, diffraction and polarization of light waves and their applications
- study the principles of MW, IR, Raman and Resonance Spectroscopy and its applications.
- understand the working principle of Lasers , and their applications
- study different types of optical fiber and its applications.

UNIT-I: Geometrical Optics

Fermat's Principle - Dispersion of Light - Dispersive Power - Deviation without dispersion - Dispersion without deviation- Constant deviation Prism- Constant deviation spectroscope- Aberration- Spherical aberration- methods of minimizing spherical aberration - Chromatic aberration of a lens – Lateral chromatic aberration - Eyepiece- Huygen's eyepiece - Ramsden's eyepiece.- Fourier optics (Basic concept only).

UNIT-II : Physical Optics

Interference - Condition for sustained interference of light - Fresnel's Prism - colors of thin films due to transmission - Michelson Interferometer and its applications. Fresnel & Fraunhofer diffraction - Zone plate - construction - theory- Diffraction at straight edge -Plane transmission grating - theory - Determination of l of light using grating (Normal Incidence) - Polarization - double refraction -Nicol prism - Theory of Production of elliptically and circularly polarized light - Quarter wave plate - Half- wave Plate-Detection of plane , circularly and elliptically polarized light - Optical activity.

UNIT-III: Microwave and Infrared Spectroscopy

Theory of Microwave spectroscopy - diatomic molecule as a rigid rotator-Instrumentation. IR - Range of IR radiation - theory of IR absorption

spectroscopy - theory of vibrational diatomic molecule as anharmonic oscillator - Instrumentation.

UNIT -IV: Raman and Resonance Spectroscopy

Raman spectroscopy: Principle - characteristics and properties of Raman lines - Difference between Raman and IR spectra - quantum theory – Perkin Elemer Raman spectrometer. Resonance Spectroscopy: ESR, NMR, NQR (Principle & Theory only).

UNIT -V: LASER and Fiber Optics

Basic ideas of Lasers - stimulated emission and radiation – Population inversion - He- Ne Lasers - Semiconductor Lasers - Laser Raman Spectroscopy- Holography - Principle and method - applications –Optical fiber and its importance - Types of fibers-Propagation of light waves in optical fiber - acceptance angle and cone - Numerical aperture- modes of propagation- Applications.

COURSE OUTCOME

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

CO1: Understand the fundamental and operation principle of modern lasers.

CO2: Apply the laser operation principles to atom and molecular physics, solid state physics, quantum mechanics and physical optics.

CO3: Demonstrate solid knowledge of modern laser spectroscopic techniques.

CO4: Interpret IR spectroscopy. Explain working principles and taking spectrum of IR spectroscopy device.

CO5: Examine the concepts of optical fiber and its application.

Reference Books

- R. Murugesan, Kiruthiga sivaprasath, Optics and Spectroscopy, S.Chand & Company Ltd, 7th Revised Edition. 2010.
- Gurdeep R. Agarwal and Sham K.Anand - Spectroscopy (atomic and molecular), Himalaya Publishing House, 2004.
- Laser and fiber Optics, by the Department of Physics.
- S.L.Kakni, K.C. Bhandari, A text book of Optics, S.Chand and Sons, New Delhi, 2002.
- N. Subramanyam, Brijal. A Text Book of Optics S.Chand and Company Ltd., New Delhi.
- B.B.Laud Lasers and Non-Linear Optics.
- H.S. Randhawa, Modern Molecular Spectroscopy, Macmillan India Ltd.

Physics Practical – VI
Paper – VI

Any Seven Practical

1. Logic gates – by discrete components.
2. Series and Parallel resonance.
3. Convex lens – f, R and m.

4. Concave lens – f, Rand m.
5. Conversion of galvanometer into an ammeter.
6. Conversion of galvanometer into an voltmeter.
7. Acceptance angle, Numerical Aperture – fibre optic cable.
8. L,C,R – series resonance .
9. L,C,R – parallel resonance .

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