

Amrita VishwaVidyapeetham

Draft Syllabi- B.Sc B.Ed (Physics, Mathematics, Computer Science)

SEMESTER I

- ❖ Communicative English –
 - ❖ Language I
 - ❖ Cultural Education
- } Same as in all UG Programmes at Amrita
- ❖ Physics Paper I

18PHY103MECHANICS 3 0 2 4

Objectives : To enable students to understand Newtonian mechanics and apply Newton's laws to explain natural physical phenomena.

Unit I:

Vector Analysis: Integrals (line, surface and volume), Physical significance of Gradient, Divergence and curl, statement of Gauss's and Stroke's theorems.

Particle dynamics (review), Review of the equations of motion, projectile motion, Newton's First, Second and Third Law of Motion, Newton's I Law as a basic kinematical law defining a frame of reference, Newton's II Law as a basic dynamical law of mechanics and Newton's III law as an interaction law, Frames of reference, inertial and non inertial, pseudo forces, Force laws, weight and mass, Application of Newton's law, importance of free body diagrams representing forces on the body in a free body diagram and frictional forces. Discussion of importance of friction in daily life.

Unit II:

Work and Energy: Work done by a constant force and by a variable force – one and two dimensional cases. Kinetic energy and work-energy theorem, Significance of the work-energy theorem, power. The importance of language in Physics to be highlighted by differentiating the meaning of 'work', 'power', 'energy' as defined in Physics and in daily life.

Conservation Laws: Introduction, conservative forces, potential energy, complete solution for one, two and three dimensional systems, non-conservative forces, conservation of energy, conservation of energy to be seen as a spreading out and appearing in different forms, mass and energy.

Conservation of Linear Momentum: Centre of mass, motion of the center of mass, linear momentum of a particle, linear momentum of a system of particles, conservation of linear momentum, some applications of momentum principle, systems of variable mass – Rocket equation.

Collisions: Elastic and Inelastic, Collision in one and two dimensions.

Unit III:

Gravitation: Historical Introduction, Newton's law of Universal Gravitation, Universal Gravitation constant 'G', inertial and gravitational mass, variation in acceleration due to gravity with altitude and depth, motion of planets and satellites, gravitational field and potential,

gravitational potential energy, potential energy for many particle systems, calculations of field and potential for (a) a spherical shell, (b) a sphere, energy consideration in the motion of planets and satellites.

Central Force: Kepler's laws of planetary motion, the inverse square law, Rutherford's problem, derivation of Kepler's Law from Universal law of Gravitation.

Unit IV:

Rotational Kinematics

Rotational variables, angular velocity, angular acceleration. Rotation with constant angular acceleration, Linear and angular variables, kinetic energy of rotation, rotational inertia, calculation of rotational inertia – of a rod, sphere and cylinder, torque, Newton's laws of rotation, work, power and work – kinetic energy theorem.

Unit V:

Dynamics of Rigid bodies

Angular momentum and moment of inertia, Theorem on moment of inertia, moment of inertia for (i) solid cylinder, (ii) rectangular slab, (iii) solid sphere and (iv) circular hoop.

Fluid Mechanism

Ideal fluids, Equation of Continuity, Viscous fluids, critical velocity, Derivation of Poiseuille's Equation.

PRACTICALS

(A minimum of ten experiments to be done from the list given below)

1. To Determine the Momentum of Inertia and Mass of a Flywheel.
2. Study of the motion of an air bubble.
3. Study of the motion of a freely falling body
4. Study of the acceleration of a body subjected to different unbalanced forces
5. Study of accelerations of different masses under a constant unbalanced force.
6. Study of conservation of energy and momentum in head-on-collision between two spheres of equal mass.
7. Conservation of momentum in an explosion
8. Determination of Surface tension of liquid by capillary rise method.
9. To study the relation between length and time period of a simple pendulum
10. Study of the rate of flow of water through a capillary tube under different pressure heads
11. Momentum of inertia of a rod by torsional oscillation.
12. Determination of Acceleration due to Gravity and radius of gyration by Bar Pendulum

Textbooks:

1. J C Upadhyaya, "*Classical Mechanics*", Himalaya Publishing house, Reprint-**2013**.
2. D S Mathur, "*Mechanics*", S Chand and company, New Delhi, Reprint-**2001**.
3. BrijLal, N Subrahmanyam, "*Properties of matter*", 6th edition, Eurasia publishing house Ltd.New Delhi, Reprint-**1993**.

References:

1. Halliday, Resnick, Jearl Walker, “*Principles of Physics*” 9th edition, Wiley, 2013.
2. Berkeley Physics Course, Vol-1 “*Mechanics*”, 2nd edition, Charles Kittle, Walter D Knight, Malvin A Ruderman, Carl A Helmholtz, Burton J Moyer, Tata McGraw Hill Education Private Limited, New Delhi, (SIE)-2011.
3. D S Mathur, “*Elements of properties of matter*”, S Chand and company, New Delhi, Reprint-2007.

❖ Mathematics Paper I

18MAT101CALCULUS

3 1 0 4

Objective: To enable students to understand the meaning of differentiation and integration and apply the techniques of indefinite and definite integration.

Unit I:

Limits and continuity: Rates of Change and Limits – Calculating Limits using Limiting Laws – The Precise definition of Limit – One-Sided Limits and Limits at Infinity – Continuity – Tangents and Derivatives.

Chapter-2 (Sections 2.3-2.7)

Unit II:

Differentiation: The Derivative as a Function – Differentiation Rules – The Derivative as a Rate of Change – Derivatives of Trigonometric Functions – The Chain Rule and Parametric Equations – Implicit Differentiation -th derivatives of the functions: e^{ax} , $(ax + b)^n$, $\log(ax + b)$, $\sin(ax + b)$, $\cos(ax + b)$, $e^{ax} \sin(bx + c)$, $e^{ax} \cos(bx + c)$ – Problems.

Chapter-3 (Sections 3.1-3.6)

Unit III:

Application of Derivatives: Extreme values of Functions – The Mean Value Theorem – Monotonic Functions and the First Derivative Test – Concavity and Curve Sketching.

Chapter-4 (Sections 4.1-4.4)

Unit IV:

Integration: Estimating with Finite Sums – Sigma Notation and Limits of Finite Sums – The Definite Integral – The Fundamental Theorem of Calculus – Indefinite Integrals and the Substitution Rule – Substitution and Area between Curves.

Chapter-5 (Sections 5.1-5.6)

Unit V:

Techniques of Integration: Basic Integration Formulas – Integration by Parts – Integration of Rational Functions by Partial Fractions – Trigonometric Integrals – Trigonometric Substitutions– Improper Integrals.

Chapter-8 (Sections 8.1-8.4, 8.8)

Textbooks:

Calculus by Finney and Thomas, Pearson, Eleventh Edition, 11th Edition, Pearson, 2009.

References:

1. M. J. Strauss, G. L. Bradley and K. J. Smith, *Calculus*, 3rd Edition, Dorling Kindersley (India) Pvt. Ltd. (Pearson Education), 2007.
2. S Balachandra Rao, *Differential Calculus*, New Age Publications, 2005

❖ Computer Science Paper I

18CSA104 COMPUTER FUNDAMENTALS AND C PROGRAMMING 3 0 2 4

Objectives: To enable students to keep pace with the changes in the IT and to describe the main principles of procedure oriented programming, the central formalisms used in the description of programming languages.

Unit I:

Introduction to computer systems: Importance of computers, Types of computers. What computers can do, what computers can't do, Characteristics of computers. **Classification of computers:** Microcomputer, Minicomputer, Mainframe computers, Super computers. **Components of computers:** CPU, ALU, Control Unit, Memory-Registers & Addresses. **Types of memory:** Primary memory – RAM, ROM, EPROM, EEPROM, Static and Dynamic RAM, Secondary memory. How the CPU and Memory works, Operating systems, types of operating systems.

Unit II:

Input Devices & Output Devices: Introduction, functions, different types of input devices- Key board, Mouse, Track ball, joystick, scanners, Touch screen, and Light pen. Output Devices- Monitors, Printers, Plotters, Sound Cards & Speakers. **Operating System:** Introduction, Functions of OS-job management, Batch processing, On-line processing, Data management, I/O management. **Classifications of OS:** multi user, Multiprocessing, multitasking, multithreading, real-time.

Unit III:

Word processors: Notepad, Microsoft office word, **Spread sheets, presentation graphics.**

Introduction to Internet and World Wide Web: Internet basics, internet protocols, internet addressing, web browsers, searching the web, internet chat, email, internet, E-commerce.

Unit IV:

Introduction to programming: Problem solving techniques, Algorithms, Flowcharts.

Introduction to C language: History and features, C as structured language, C as middle level language, Structure of C program, applications, advantages, preprocessor directives, Execution phases C conventions, character set, declaration of variables, escape sequences, operators, types, operator precedence, type conversions, mathematical library functions, input output operations.

Unit V:

Decision making, Control Structures, Looping statements, Arrays – Single dimensional arrays, Two- dimensional arrays: declaration, initialization, accessing elements of array and memory representation.

Strings: defining strings, initializing, accessing, arithmetic operations on characters, character by character input and output, string handling functions.

Textbooks:

1. “Fundamentals of Information Technology” , Alexis Leon and Mathew Leon, Leon TECHWorld.
2. “Let us C”, YashwanthKanetkar, 13th Edition, BPB publications.
3. “Programming in ANSI C”, E Balaguruswamy, Sixth Edition, Tata McGraw-Hill Publishing Company limited.

References:

1. “Information technology- the Breaking wave”, Dennis P Curtin, Kim Foley, Cathleen Morin Tata McGraw-Hill Publishing Company limited.
2. “Test Your C Skills”, YashwanthKanetkar.
3. “Exploring C”, YashwanthKanetkar.

❖ **Environmental Science and Sustainability - Same as in all UG Programmes at Amrita**

SEMESTER II

- ❖ Professional Communication
 - ❖ Language II
 - ❖ Cultural Education
- } Same as in all UG Programmes at Amrita
- ❖ Physics Paper II

18PHY112 WAVES, HEAT AND THERMODYNAMICS

3 0 2 4

Objectives : To enable students to see relation between linear and rotational motion and understand the production and propagations of waves in elastic media. And also understand the laws of thermodynamics and its applications.

Unit I:

Oscillations : Simple Harmonic Motion (SHM), the restoring force along with its kinematical model, force law, SHM equation and idea of phase and phase difference, energy considerations in simple harmonic motion. Superposition of the SHMs, Lissajous figures, Equation for damped vibrations, forced vibrations. Analysis of complex waves. Fourier Series, Application to square wave, triangular wave.

Waves in elastic media: Review of Mechanical waves, types of waves, travelling waves, the superposition principle, wave speed, power and intensity in wave motion, expression for transverse waves in a stretched string, interference of waves, standing waves, resonance, simulation and demonstrations using ripple tank.

Sound Waves: Audible, ultrasonic and infrasonic waves, propagation and speed of longitudinal waves, travelling longitudinal waves, standing longitudinal waves, vibrating systems and source of sound, beats and Doppler effect, wave equation for sound pressure, sound power and its measuring unit (decibel).

Unit II:

Kinetic Theory of Gases

Introduction, Kinetic Theory of Gases, kinetic theory as particle model and usefulness of the model in explaining the regular structure of crystals (Review), an ideal gas – a macroscopic description, an ideal gas – a microscopic description, kinetic calculation of pressure, kinetic interpretation of temperature, ideal gas scale, intermolecular forces, specific heat of an ideal gas, law of equipartition of energy.

Mean free path, van der Waal's equations of State, critical constants, application to liquefaction of gases.

Unit III:

Heat and First Law of Thermodynamics

Thermal equilibrium, Zeroth law of thermodynamics, ideal gas temperature scale, heat as a form of energy, quantity of heat and specific heat, molar heat capacities of solids, the mechanical equivalent of heat, heat and work; First law of thermodynamics, Discussion on usefulness of First Law of Thermodynamics in Meteorology, some special cases of the first law of thermodynamics –

(i) adiabatic process, (ii) isothermal process, (iii) isochoric process, (iv) cyclic process, (v) free expansion.

Unit IV:

Entropy and Second Law of Thermodynamics

Introduction, reversible and irreversible processes, the Carnot cycle, Carnot engine, Carnot theorem, absolute scale of temperature, second law of thermodynamics, efficiency of engines, the thermodynamic temperature scale, entropy in reversible and irreversible processes, entropy and the II law, entropy and disorder, consequences of II and III law of thermodynamics, Second law of thermodynamics as a probabilistic statement.

Low temperature Physics – Porous Plug experiment, temperature of inversion, principle of regenerative cooling, liquefaction of air by Linde's method.

Unit V:

Thermodynamic potentials: Internal Energy, Enthalpy, Helmholtz function, Gibbs function, relations among these functions, Gibbs-Helmholtz equations

Maxwell's Thermodynamic Relations: Derivation of Maxwell's thermodynamic relations, TdS equations, Internal energy equations, Heat capacity equations. Change of temperature during Adiabatic process using Maxwell's relations

PRACTICALS

(A minimum of ten experiments to be done from the list given below)

1. Study of the oscillations of a column of water as a function of its length and study of damped oscillation
2. To determine the velocity of sound at 0° C and the end correction by setting up a resonance column (first resonance length)
3. Study of torsional oscillations of a loaded wire and determination of the rigidity modulus of the material of the wire
4. Verification of Stefan's Boltzmann law using Potentiometer
5. Study of Newton's law of cooling.
6. Determination of Thermal conductivity of a bad conductor by Lee Charlton method
7. Specific heat of a solid by the method of mixtures
8. Determination of latent heat of fusion of ice by calorimetric method
9. J by Joules Calorimeter
10. Study of transverse vibrations on a sonometer. To determine the frequency by (i) absolute method, (ii) Comparison method
11. Melde's experiment – determination of frequency
12. Frequency of AC by a sonometer.

Textbooks:

1. Halliday and Resnick: Fundamentals of Physics, 9th edition, Wiley India, 2011.
2. Brijlal ,N. Subramanyam P.S. Hemne: Heat Thermodynamics and Statistical Physics, 1st edition. S Chand Publishing, 2007.
3. . S C Gupta: Thermodynamics, 1st edition, Pearson, 2005.

References:

1. R. H. Dittaman and M. W. Zemansky: Heat and Thermodynamics, 7th edition, The McGraw-Hill companies, 2007.
2. S. J. Blundell and K. M. Blundell: Concepts in Thermal Physics, 2nd edition, Oxford University Press, 2006.

❖ Mathematics Paper II

18MAT118MATRICES AND VECTOR CALCULUS 3 1 0 4

Objectives: To enable students to understand the basic concepts of matrix calculus, vectors and basic vector operations and solve computational problems of vector calculus.

Unit I:

Systems of Linear Equations: Linear System of Equations, Gauss Elimination, Consistency of a linear system of equations, Vectors, Linear independence and dependence of vectors, Rank of a Matrix.

Text Book-1: Chapter-1 and 2

Unit II:

Eigen value problems: Eigen values, Eigen vectors, Properties of eigen values and eigen vectors, Cayley-Hamilton theorem, Some Applications of Eigen value Problems, Similarity of Matrices, Diagonalization of a matrix, Power of a matrix, Diagonalization by orthogonal transformation, Quadratic forms, Canonical form of a quadratic form, Nature of quadratic forms.

Text Book-1: Chapter-7.

Unit III:

Three dimensional coordinate systems, vectors, dot and cross products. Vector Differentiation: Gradient, divergence and curl, identities, invariant scalar.

Text Book-2: Chapter-12 (Sections 12.1-12.5)

Unit IV:

Line integrals, Vector Fields, Work, Circulation and Flux, Path Independence, Potential Functions, and Conservative Fields, Green's Theorem in the plane.

Text Book-2: Chapter-16 (Sections 16.1-16.4)

Unit V:

Surface area and surface integrals, Parametrized surfaces, Stokes Theorem, The divergence Theorem and a unified theory

Text Book-2: Chapter-16 (Sections 16.5-16.8)

Textbooks:

1. Elementary Linear Algebra', Howard Anton and Chris Rorres, John Wiley & Sons, 1994, Seventh Edition.
2. Calculus by Finney and Thomas, Pearson, Eleventh Edition, 11th Edition, Pearson, 2009.

References:

1. Murray R Spiegel, Theory and problems of vector analysis, Schaum's outline series, McGraw-Hill Book Company 1974..

❖ Computer Science Paper II**18CSA115 BASICS OF COMPUTER NETWORKING & WEB TECHNOLOGY 3 0 2 4**

Objective: The purpose of this course is to understand the basics of networking technologies and to design web pages and to establish adequate formatting and styles.

Unit I:

Evolution of Computer Networking, Types of Connection- point-to-point, multipoint, Types of Network-LAN, WAN, MAN, Networks topologies-star, mesh, bus, ring, Connection oriented and Connection less Services, Network Devices-Hub, router, switch, gateway, bridge, The OSI reference model, TCP/IP Reference Model.

Unit II:

Introduction to Internet, history of internet, Hardware and software requirements of internet: Host, terminal, modem, ISP, web browser, websites, social networking sites, blogs, search engines.

Unit III:

Introduction to HTML, basic HTML elements, formatting tags- bold, italic, size, underline, deleted, emphasize. Color: color names, color values, marquee, paragraph, link tags, image tag, list – ordered list, unordered list, definition list, Superscript, Subscript. Case study: Design a simple web page by using above tags.

HTML table – row span, column span, body color, border, cell spacing, cell padding, align, caption. Multimedia elements- Inserting Audio files, inserting Video files, screen control attributes. Frames and frameset attribute. Case study: Design a simple web page by using above tags.

Unit IV:

Introduction to Forms, Get and Post methods, Text Input Controls: text, password, email, url, number, range, date, month, time, week. Label, Checkboxes Controls, Radio Box Controls, Select Box Controls, Text area, File Select boxes, Buttons, Submit and Reset Button, text field tag, File

Upload, required attribute. Case study: Design a form by using form and table elements and perform validation.

Unit V:

Introduction to CSS, Types of style sheets, Applying styles to specific groups of elements – class selector, id selector, CSS background, CSS text, CSS fonts, color, image, CSS box model.

Text books:

1. Harley Hahn - Internet Complete Reference - Second Edition – TMH
2. The Complete reference HTML Second edition-Powell, Tata McGraw-Hill

❖ **Indian Constitution – Same as in UG Programme at Amrita**

SEMESTER III

18EDU201

GROWTH AND DEVELOPMENT OF CHILD 2 1 0 3

Objectives

On completion of the course, the student teacher will

- situate individual development in a socio-cultural context;
- develop an understanding about the impact/influence of socio-cultural context in shaping human development, especially with respect to the Indian context;
- acquire theoretical perspectives and develop an understanding of dimensions and stages of human development and developmental tasks;
- become aware of the processes of socialisation at home and school that act as shaping factors in identity formation of the school-going child.

Unit I: Learner as a Developing Individual

- 1.1 Meaning of childhood, Concept of growth and development , Stages of development
- 1.2 Developmental Characteristics of a child
 - Vygotsky's and Piaget's - Cognitive development
 - Erikson- psycho social development

Unit II: Adolescence

- 2.1 Meaning and characteristics
- 2.2 Developmental tasks of an adolescent and their implications
- 2.3 Factors influencing development - heredity and environment

Unit III: Personality

- 3.1 Concept of personality
- 3.2 Approaches to personality
- 3.3 Balanced personality- endocrine system

Unit IV: Contexts of Socialization

- 4.1 Concept of socialization – role of family
- 4.2 Schooling: peer influences, relationships with teachers
- 4.3 Social, economic and cultural differences in socialization

Unit V: Current Issues in Child Development

- 5.1 Understanding concept of legal childhood
- 5.2 Constitutional provisions for the young child
- 5.3 Protecting the rights and cultural practices and ethnic identity of minority children

Suggested activities/practicals/tutorial

- Principles of growth and development
- Influence of media on adolescents
- Adjustment concept and barriers
- Defense mechanisms with examples
- The major requirements of socialization
- The role of school in general and teacher in particular in promoting culture.
- Right to Education Act, 2009, emerging positions of early childhood and the young child in the current five year plan.
- Protection of child's right to participation (responsive environment) and prevention of child abuse, neglect and protection from punishment.
- Prevention of children at work, protecting and promoting child's right to play, rest and leisure

References:

- Government of India (1986). National Policy on Education, Department of Education, New Delhi.
- NCERT (2005). National Curriculum Framework, New Delhi.
- Cole, M., Cole, S. R. and Lightfoot, C. (2004). The Development of Children. New York: Worth Publishers. Chapter 1: The study of Human Development.
- Newman, B. M. and Newman, P.H. (2007). Theories of Human Development. London: Lawrence Erlbaum Associates Publishers.
- Jeanne, Ellis Ormrod. Educational Psychology: Developing Learners. Fourth Edition
- Jeffrey Arnett (2007), Adolescence and Emerging Adulthood: A Cultural Approach. (3rd.ed.). Upper Saddle River, N.J.: Pearson.
- Lindgren, H.C. (1980). Educational Psychology in the Classroom Oxford University Press, New York.
- Patricia A. Alexander, Philip H. Winne (2006) Handbook of Educational Psychology.
- MangalS.K(2003) Advanced Educational Psychology, Prentice Hall of India, New Delhi.

18EDU280

READING AND REFLECTING ON TEXTS0 1 2 2

Objectives:

On completion of the course, the student teacher will

- Reflect on the objectives of reading.
- Analyse the process of reading.
- develop the skills of reading
- explore the problems of reading
- develop the skills of reading
- explore the problems of reading different texts
- develop the skill of documentation, note taking
- develop the habit of reading various texts
- differentiate the styles of reading various texts
- identify different skills and sub-skills of reading

Unit I:

The Reading Process

- 1.1 Objectives of Reading
- 1.2 The reading process - Reading variety of Texts
- 1.3 Types of Reading and Texts - Exploratory reading, Conceptual reading, Historical reading, Policy Documents, Narrative Texts, Expository Texts (Predictive), Autobiographical Texts, Field Experiences, Ethnographies

Unit II:

Reading Comprehension

- 2.1 Reading Skills – Skimming and Scanning.
- 2.2 Development - Critical reading, skill reading and writing
- 2.3 Responding to a text , Own opinion ,Writing with in Context

Unit III:

Reading: Pedagogical Aspects

- 3.1 Role of Language and Pedagogical aspects in Reading.
- 3.2 Impact of types of reading on students
- 3.3 Reading of different texts – Science, Mathematics, Language, Social Science, Various Class-room activities to develop reading skills

Unit IV:

Reflections of Reading

- 4.1 Documentation, Note taking, Reflective Journals, Note making
- 4.2 Analysis of various text structures
- 4.3 Difference between reading for comprehension/meaning and reading for pleasure, oral, silent reading, aural-oral-visual

Unit V:

Reading and Evaluation

- 5.1 Uses of Reading - Check the Prediction, Answers to Question, Summarises the texts Influence on Writing
- 5.2 Evaluation of loud reading – check pronunciation, use of punctuations, pause, stress.

Suggested Activities / Practicals / Tutorials

- Identifying various reading materials, texts etc.,
- Differentiating various texts
- Analyse various text structures

- Activities to enhance comprehensive skills.
- Opportunities to be provided to prepare policy documents, reports about school functioning, documenting once own experiences in the school.
- Developing recording skills, reflecting on existing available documents of field notes

References:

- Alderman, Gary L., and Susan K Green (2011), “Fostering Lifelong Spellers through Meaningful Experiences” *The Reading Teacher*, 64(8), 599-605
- Ediger, Marlow (2011), “Shared Reading, the Pupil, and the Teacher” *Reading Improvement*, 48(1), 55-58.

❖ **Amrita Value Programme - Same as in all UG Programmes at Amrita**

❖ **Physics Paper III**

18PHY202

ELECTRICITY AND MAGNETISM

3 0 2 4

Objective: To enable students to acquire a broad conceptual framework of electromagnetic phenomena.

Unit I:

Electrostatics: Electrical pressure on a charged surface. The path traced by a charged particle in a transverse electric field. The attracted disc electrometer – construction, theory and applications.

Review of concept of electric field and electric field due to point charge. Electric field due to (i) electric dipole, (ii) line of charge and (iii) charged disc

A dipole in an electric field, torque on a dipole in uniform and non-uniform E fields, potential energy of an electrical dipole.

Unit II:

Electric Fields in matter: Capacitance, parallel plate capacitor, calculation of capacity of a spherical and cylindrical capacitor, energy stored in a capacitor, capacitor with dielectric, atomic view of dielectrics, polarization, electric field due to a polarised material, Gauss’s law in dielectrics, Dielectric constant, Energy density of an electrostatic field (with and without dielectric).

Polarisability and susceptibility – Frequency dependence of polarisability, Clausius- Mossotti equation.

Unit III:

Magnetostatics: Review of Ampere’s law, B near a long wire, Magnetic lines of induction, force between two parallel conductors, definition of ampere, B for a solenoid, Biot-savart’s law, and applications of Biot-savart’s law.

The magnetic field, Lorentz force and definition of magnetic field, magnetic induction, magnetic force on a current element, circulating charges, Cyclotron resonance frequency,

Cyclotron. Magnetisation, magnetisation current density, magnetic field intensity, magnetic susceptibility and permeability.

Unit IV:

Electromagnetic Induction

Review of Faraday's law, Faraday's experiment, Lenz's law, Time varying magnetic fields, Application in betatron.

Inductance: Self inductance, LR circuit, energy in a magnetic field, magnetic energy density.

Unit V:

Alternating current and filters

R M S values, Response of LR, CR and LCR circuits to sinusoidal voltages (discussion using the j symbol), Series and parallel resonance, Half-power frequencies, bandwidth and Q-factor, Power in electrical circuits, power factor, Maximum power transfer theorem (with proof).

High-pass and low-pass filters with LR and CR combinations, Cut-off frequency, Band-pass filters

PRACTICALS

(A minimum of ten experiments to be done from the list given below)

1. Determination of Q factor by series resonance
2. Determination of Q factor by parallel resonance
3. Determination of self inductance of a coil using Anderson's Bridge
4. Determination of capacitance by measuring impedance of RC circuit
5. Determination of Inductance by measuring impedance of RL circuit
6. Mutual inductance of a solenoid by Ballistic Galvanometer
7. De Sauty's Bridge
8. Determination of resistivity of a material using low resistance
9. Determination of the specific charge of a copper(Cu^{++}) ion using Copper Voltmeter
10. Study of decay of current in LR and RC circuit
11. Measurement of B by current balance
12. To show that the behavior of an inductance in an AC circuit is analogous to that of a resistor which obeys Ohm's Law and hence to measure inductance.

Textbooks:

1. Electricity and Magnetism, Fewkes and Yarwood.
2. Electricity and Magnetism : A N Matveev, Mir Publishers, Moscow.
3. Electricity and Magnetism, F.W.Sears, Addison Wesley Co.
4. K. K. Tewari: Electricity and magnetism, S.Chand Co. Ltd., New Delhi, Reprint 2007.

References :

1. Fundamentals of Physics, 6th Edition, David Halliday, Robert Resnick and Jearl Walker, John Wiley, Inc.
2. Fundamentals of Electricity and Magnetism : A F Kipp, McGraw Hill.
3. Halliday/Resnick/Walker: Fundamentals of Physics, 8th edition, John Wiley & Sons(Asia) Pte. Ltd.
4. B. B. Laud: Electrodynamics , Wiley Eastern Limited, New Delhi.
5. David. J. Griffiths: Introduction to Electrodynamics, 3rd edition, Prentice-Hall of India Private limited, New Delhi.
6. W.H. Hayt and J. A. Buck: Engineering Electromagnetism , 6th edition, Tata McGraw Hill, New Delhi.
7. BrijLal and N.Subrahmanyam : A text book of Electricity and Magnetism, 19th edition- RatanPrakashanMandir, Educational and University Publishers, Agra.
8. A.B.BhattacharyaR.Bhattacharya, Under Graduate Physics, Volume II, New Central Book Agency(P) Ltd., Kolkata.
9. D.N. Vasudeva: Fundamentals of Magnetism and Electricity, 12th edition-S.Chand and Co. Ltd., New Delhi

❖ Mathematics Paper III

18MAT201DIFFERENTIAL EQUATIONS

3 1 0 4

Objectives: To enable students to develop the knowledge of standard concepts of ordinary differential equations and apply analytical techniques to compute solutions to various differential equations.

Ordinary Differential Equations

Unit I:

Review of differential equations (order, degree, linear, nonlinear, implicit and explicit form of solution, general solutions, particular solution, singular solution). Exactness, nonexact equations reduce to exact form.

Part I: 1.1-1.9, 2.12-2.22

Equations of first order but of higher degree: Equations solvable for $\frac{dy}{dx}$, y , x , equations in Clairaut's form, equations reducible to Clairaut's form.

Part I: 4.1-4.11

Unit II:

Equations of Second order: Linear homogeneous differential equations with constant coefficients, Euler- Cauchy equation, Linear Nonhomogeneous Differential Equations: Wronskian, linear independence, Method of undetermined coefficients. Method of variation of parameters.

Part I: 5.1-5.5, 6.1-6.3, 1.12, 1.13, 5.26-5.27, 7.1-7.5

Unit III:

Systems of first order linear equations: Conversion of nth order differential equation to n first order differential equations, homogeneous linear system with constant coefficients, fundamental matrices, complex eigen values, repeated eigenvalues. simultaneous linear differential equations with constant coefficients, simultaneous linear differential equations with variable coefficients,

PART I: 8.1-8.3, 2.1- 2.7

Partial Differential Equations

Review of partial differential equations (order, degree, linear, nonlinear).

Unit IV:

Formation of equations by eliminating arbitrary constants and arbitrary functions.

Solutions of partial differential equations: General, particular and complete integrals. Lagrange's linear equation, Charpit's method, Methods to solve the first order partial differential equations of the forms $f(p,q) = 0$, $f(z,p,q) = 0$, $f_1(x,p) = f_2(y,q)$ and Clairut's form $z = px + qy + f(p,q)$ where $p = \frac{\partial z}{\partial x}$ and $q = \frac{\partial z}{\partial y}$.

Part III: 1.1 – 1.5, 2.3-2.12, 3.1-3.2, 3.7-3.8, 3.10-3.18

Unit V:

Classification of partial differential equations of second order. Homogeneous linear partial differential equations with constant coefficient of higher order. Non-homogeneous linear partial differential equations of higher order.

Part III: 8.1, 4.1-4.12

Textbooks:

1. M.D. Raisinghania, Ordinary and Partial Differential Equations, S.Chand, 18th edition, 2016.

References:

1. William E. Boyce and Richard C. DiPrima, Elementary differential equations and boundary value problems, Wiley india, 9th edition, 2012.
 2. Nita H, Shah, Ordinary and Partial Differential Equations : Theory and Applications, PHI learning, 2nd edition, 2015.
- Dennis Zill, A First Course in Differential Equations, Cengage Learning, 9th edition, 2009.

COMPUTER SCIENCE PAPER III

18CSA204OBJECT ORIENTED PROGRAMMING

3 0 2 4

Objective: The purpose of this course is to understand the object oriented programming concepts and to implement those concepts to solve problems.

Unit I:

Introduction: Characteristics of Objects, Object Oriented Development, Object Oriented Themes – Abstraction, Encapsulation, Polymorphism and Inheritance.

Unit II:

Basic C++ Concepts: Classes and objects, Constructors and Destructors, Function overloading, Operator overloading, Friend Function.

Unit III:

Generalization and Inheritance – Single, multi-level, Hierarchical, Hybrid, Multiple Inheritance, Constructors and Destructors in derived classes.

Unit IV:

Virtual base class, Polymorphism – Compile Time and Run time, Function overriding, Abstract Classes. Introduction of Virtual functions.

Unit V:

Templates, Exceptions – Concept, Implementation of user defined exceptions. Files – Input, output Streams.

Text books :

1. Object Oriented Programming with C++ - E. Balagurusamy, TMH.
2. Object Oriented Design and Modeling – James Rambaughetal, PHI.

References:

1. Object Oriented Conceptual Modeling – Dillon and Lee, PHI.
2. Introduction to Object Oriented Analysis and Design – Stephen R. Shah, TMH.
3. The Waite's Group OOP using C++ - Robert S. Lafore, Galgotia Publications.

Objectives:

On completion of the course, the student teacher will

- develop basic understanding and familiarity with key concepts—gender, gender bias, gender stereotype, empowerment, patriarchy and feminism;
- analyse gender issues in school, curriculum, textual materials across disciplines and pedagogical processes.
- critically analyse the impact of policies, programmes and scheme for promotion of gender equality and empowerment.
- understand on how school as an institution addresses gender concerns in curriculum, textual materials and pedagogy.
- understand how gender relates to education and schooling.

Unit I:**Gender Roles**

- 1.1 Patriarchy, feminism and gender.
- 1.2 Meaning of gender roles, influences of gender roles.
- 1.3 Gender bias, trans- gender, gender stereotyping.

Unit II:**Women Empowerment**

- 2.1 Women empowerment – concept, meaning and need.
- 2.2 Policy initiatives relating to women empowerment-schemes and programmes relating to various commissions and committees.

Unit III:**Gender and Education**

- 3.1 Gender Identities and Socialisation practices in- family, schools.
- 3.2 Girls education- issues of access, retention and exclusion-National Policy BetiBachaoBetiPadhao.
- 3.3 Violence against women- Family, school, work place and media (print and electronic)

Unit IV:**Elimination of Gender Disparity**

- 4.1 Gender disparity and Curriculum-role of Co-Education in eliminating gender disparity.
- 4.2 Teacher as an agent of change in eliminating gender disparity and gender In-equality.

- 4.3 Role of society, family, school, counselors, women and Child Welfare Department and Media.

Unit V:

Gender Equality - Issues and Challenges

- 5.1 Indian Constitutional Provisions relating to women; Violence against women - female infanticide, human trafficking.
- 5.2 Legal provisions relating to protection of rights of women. Role of UNO.
- 5.3 Institutions for redressal of sexual harassment and abuse

Suggested Activities / Practicals / Tutorials

- Debate on how boys and girls perceive role models in their own lives
- Preparing analytical report on portrayal of women in print and electronic media
- Organising debates on equity and equality cutting across gender, class, caste, religion, ethnicity disability, and region.
- Preparation of project on critical analysis of recommendations of commissions and policies on capacity building and empowerment of girls and women
- Project on women role models in various fields with emphasis on women in unconventional roles.
- Debates and discussions on violation of rights of girls and women
- Role plays on women empowerment.
- Brain storming sessions after watching videos of great women.

References:

- Sarojini, N.B., et al. (2006). Woman's Right and Health. New Delhi: NHRC.
- Pachauri, S.K. (1999). Women and human rights. Delhi: APH Publications.
- Gandotra, V., & Patel, S. (2009). Women working condition and efficiency. New Delhi: New century Publication.
- Mishra, N. (2008). Woman laws against violence and abuse. New Delhi: Pearl Books.
- Sarojini, R. (2002). Justice for women. Hyderabad: Sai Srinivasa Printers

18EDU281

DRAMA AND ART IN EDUCATION 0 2 1

Objectives:

On completion of the course, the student teacher will

- get familiarized with the concept of Art education
- identify the varieties in art education
- accept challenges of art in education
- analyse the benefits of art education
- identify the Current trends of Art in Education
- bring out the role of art in the student's academic achievement
- describe various teaching techniques of art in education
- use technology in art in education
- practice art supporting teaching strategies
- get practical experience in using art in education

Unit I:

Introduction to Drama and Art in Education

- 1.1 Historical concept, need and importance
- 1.2 Nature and interpretation of Drama and Art in Education

Unit II:

Role of Drama and Art in Education

- 2.1. Role of Arts- Visual, fine, performing and digital
- 2.2. Arts in Education for all-round development of an individual

Unit III:

Add on effects of Arts and its various forms in Pedagogy

- 3.1 Capacity Building programme-self-expression and exploration of Creativity.
- 3.2 Current trends- Interpersonal, Intercultural sensitization and Instructional mode of classroom teaching.
- 3.3 Employs maxims of teaching-Known to Unknown, Particular to General Achievement and performance.
- 3.4 Role of Art Education in inclusive schools and specially abled children

Unit IV:

Performing Art Forms and Artists

- 4.1. Identification of different performing art forms and artists: Dance, Music and Musical Instrument, theater, Puppetry etc.
- 4.2. Drama, Arts & Music- Critically analyze and Review-prepare questionnaire-opinion air Dance and other Arts

Unit V:

Mode of Evaluation-Follow up

- 5.1 Organization and evaluation of various school programmes and reporting/criteria to be followed in arranging stage
- 5.2. Indian festivals and its contribution to the arts

Suggested Activities / Practical / Tutorials

- Select the appropriate mode of art to transact textual information in the class and prepare a lesson plan.
- Prepare scripts for drama, dance drama, and art supporting programme for school curriculum
- Attend and observe various cultural activities conducted by various organizations and write a synopsis
- Visiting art galleries and preparing a report
- Conducting interviews with great artists and performers: video recording

- Undertake Survey to assess the importance and application of art in education
- Conduct competitions during important days- music, drawing, dance, collage making, role play and skits etc.
- Conduct school level exhibitions of drawing, paintings, charts, artifacts, greeting cards, placards and games etc.
- Watching various cultural programme and videos on television and internet List out the educational benefits

❖ **Life Skills I- Same as in all UG Programmes at Amrita**

SEMESTER IV

18EDU211

LEARNING AND TEACHING 2 1 0 3

Objectives:

On completion of the course, the student teacher will

- comprehend the meaning of teaching and learning
- justify the role of teacher as facilitator
- substantiate teaching as profession
- reflect on his/her own experiences to comprehend the nature and different approaches to learning.

- explore the possibilities of comprehending and analyzing human cognition, designing learning environment and experiences at school.
- acquire knowledge of various theories of learning and analyse their implications for teaching and learning.
- analyse the existing individual differences and influencing factors.
- analyse the nature and process of learning in the context of various learning theories.

Unit I:

Learning and Learning Process

- 1.1. Educational Psychology – meaning, branches, need and importance for teachers, methods of psychology.
- 1.2. Learning - meaning, relationship with development, maturation and readiness.
- 1.3. Issues related to learning – motivation, Memory and Forgetting, Transfer of Learning Intelligence- A brief description of theories of intelligence- Modern theories (Howard Gardner, Robert Sternberg).

Unit II:

Learning -Constructivist Perspective:

- 2.1. Learning as 'construction of knowledge'- 'transmission and reception of knowledge'.
- 2.2 Perspectives and Theories on human learning: Behaviourist (Pavlov and Skinner), cognitive constructivist (Bruner, Piaget, Vygotsky).
- 2.3 'Construction of knowledge' - Experiential learning, reflection and meta-cognition as facilitating factors of understanding.

Unit III:

Teaching:

- 3.1 Meaning, importance, teaching as a profession.
- 3.2 Preparation for teaching - Need, analysing teaching in diverse contexts, Teacher as a guide, facilitator and counselor.
- 3.3 Modes of Transaction-Teacher centered, student centered, subject centered, co-operative, team approaches, Different strategies and skills of teaching.

Unit IV:

Individual differences among Learners

4.1 Individual differences: Nature, Dimensions of differences in psychological attributes—cognitive abilities, interest, aptitude, creativity, personality, values.

4.2 Accommodating individual differences in the class-room.

4.3 Measurement of individual difference with reference to cognitive attributes(intelligence, aptitude and creativity and non-cognitive attributes (attitude, interest and values)

4.4. Guidance and Counselling: Meaning, types and importance.

Unit V:

Learning and Environment

5.1. Class room as a group and its impact, socialization of the learner, concept of social learning, Group cohesiveness, Sociometry.

5.2. Factors related /influencing learning – School, Home, Family, Society, Peer-group.

5.3. Mental Health and hygiene, Adjustment and defense mechanisms.

Suggested Activities / Practical's / Tutorials

- Study of behavioural patterns of VIII/IX std. students.
- Activities leading to the emergence of creativity or divergent thinking.
- Analysis of a situation and identification of the type of transfer of learning
- Identification of the characteristics of a well-integrated personality by taking the example of celebrities Dr.Radhakrishnan, Mother Theresa, Sir M. Vishweshwaraiah,
- Mahatma GandhijianAurobindo
- Preparation of a sociogram.
- Case study of a well-adjusted or maladjusted student/person.
- Finding out the educational implications by analyzing the learning theories
- Ravens progressive matrices- nonverbal intelligence test Creativity test.
- Process – Episode, Social Constructivism
- Different situations – Styles and instructional strategies
- Tools – checklist, rubric
- Environment – Facilitating learning, games (group dynamics– facilitating hands on learning) simulations, models and projects.
- Measures to motivate students.
- Defence mechanisms with examples.
- Characteristics of educationally backward and gifted children.

References:

- Chauhan, S. (2003). *Advanced Educational Psychology (6th Edn.)*. New Delhi: Vikas Publications.
- Dandapani, S. (2001). *Advanced Educational Psychology (2nd Edn.)*. New Delhi: Anmol Publications Pvt. Ltd.
- Hergenhahn, D. R. & Osmon, H. (2005). (7th Edn.) *An Introduction to Theories of Learning*. N J: Prentice Hall Inc.
- Hurlock, E. (2003). (5th Edn.) *Developmental Psychology*. New Delhi: MC Graw Hill.

- Levin, J.R. & Allen, V. L. (1976). *Cognitive Learning in Children: Theories and Strategies*. NY: Academic Press.
- Medin, D. (1996). (2nd Edn.). *Cognitive Psychology*. N Y: Harcourt Brace College.
- Omrod, J. D. (2000). (3rd Edn.). *Educational Psychology: Developing Learners*. N J: Prentice hall Inc.
- Rothstein, P. R. (1990). *Educational Psychology*. N Y: Mc Graw Hill.
- Skinner, C. E. (1984). *Educational Psychology*. New Delhi: Prentice hall Inc.
- Goleman, D. (1997). *Emotional Intelligence*. London: Bloomsbury Publishing PLC.
- Goleman, D. (1999). *Working with Emotional Intelligence*. London: Bloomsbury Publishing PLC.

18EDU212

INCLUSIVE SCHOOL

2002

Objectives:

On completion of the course, the student teacher will

- trace the historical perspective of Inclusive Education
- distinguish the concepts of special education, integrated education and inclusive education
- justify the need for Inclusive Education
- analyze critically the needs, problems, causes and educational provisions meant for challenged children
- critically review issues and challenges in inclusive education
- interpret the policies and procedures for inclusive education.

Unit I:

Introduction to Inclusive Education

- 1.1 Historical perspective.
- 1.2 Concepts of Inclusion- Special Education, Integrated Education and Inclusive Education.
- 1.3 Inclusive Education-need, objectives and scope.

Unit II:

Inclusive school

- 2.1 Inclusive School – concept, need and planning -barriers free school.
- 2.2 Factors responsible for successful inclusion in the mainstream – future vision.
- 2.3 Issues and challenges in creating an inclusive environment in schools.

Unit III:

Differently - abled children in Inclusive system

- 3.1 Concept, Identification, classification, causes and characteristics of children with orthopaedical, visual, auditory, speech , mental ,learning challenges, and social disadvantages.
- 3.2 Educational provisions for children with orthopaedical, visual, auditory, speech, mental , learning challenges, and social disadvantages.

Unit IV:

Policies and Provisions for Inclusion

- 4.1 National and State Policies – Disability Act 1995, Convention of Right of Act 1992, Rehabilitation Council of India 1992 and International Policies.
- 4.2 Constitutional provisions and RTE Act.

Unit V:

Management of Inclusive School

- 5.1 Role of functionaries -Parents, Peers, Teachers, Administrators, Community, Government and Private Organizations.
- 5.2 Class room management -Teacher skills and competencies.

Suggested Activities / Practicals / Tutorials

- Identification of children with orthopaedical, visual, auditory, speech , mental, learning challenges, and social disadvantages.
- International Policies of Inclusive Education
- Case studies-individual/families/institution.
- Visit to special schools.
- Visit to inclusive schools.
- Sociometry of a small group.
- Visit to National institutes, Government organizations and NGO's.
- Interview – Parents, Peers and Teachers.
- Diagnosis and remedial measures – Procedures to be undertaken.
- Clinical and Psychological tests required.
- Designing evaluation tools- Preparing an Anecdote of an inclusive child.

References:

- Dhawan, M.L. (2007). *Education of children with special needs*, Isha books.
- Reddy Likandha (2005) *Education of children with special needs*, New Delhi: Discovery publishing House.
- Guha, Aloka (1955), *Compilation of Reading in Special Education*, Tamil Nadu: The Spastics Society.
- HegartySeamus&AlurMithu (2002) *Education and Children with Special Needs*, Sage Publications.
- KarChintamani (1996) *Exceptional children*, New Delhi: Sterling Publishers Private Ltd.
- MaitraKrihna&SazenaVandana (2008), *Inclusion Issues and Perspectives*, New Delhi :Kanishka Publishers.
- Pandey R.S. &Advani L. (1955), *Perspectives in Disability and Rehabilitation*, New Delhi; Vikas Publications.
- Prasad Lakshman (1994), *Rehabilitation of the physically handicapped*, Hyderabad: Konark Publishes Pvt. Ltd.
- Purimadhumitha& Abraham George (2004). *Handbook of Inclusive Education for educators, administrators and planners*, New Delhi: Sage publications Ltd.

- Rajkumri. N.Alice, D. Rita SugunaSundari et.al. (2006) *Special Education*, New Delhi: Discovery publishing House.

❖ Amrita Value Programme - Same as in all UG Programmes at Amrita

❖ **Physics Paper IV**

18PHY215OPTICS3 0 2 4

Objectives: To enable students to understand that light is a wave phenomenon and apply the understanding of wave phenomenon to light.

Unit I:

Wave Nature of Light and Interference

Light-electromagnetic spectrum, Rotating mirror method of determination of speed of light, Huygen's principle, explanation of reflection and refraction, Fermat's Principle, Phase change on reflection, total internal reflection.

Young's experiment - coherence, intensity distribution and visibility of fringes, Newton's rings, Fresnel's Biprism, interference in thin films, colours of thin films, interference at an air wedge, Michelson's interferometer.

Unit II:

Diffraction

Fraunhofer and Fresnel : Diffraction, Diffraction at a single slit, double slit, Diffraction by multiple slits, Diffraction grating, Resolving power – Rayleigh's criterion, Resolving power of a grating and telescope.

Fresnel diffraction, half period zone, zone plate, diffraction at a circular aperture and at a straight edge (qualitative treatment only).

Unit III:

Polarisation Polarization by reflection, Brewster's law, Malus law, Double refraction, Production and detection of linearly, circularly and elliptically polarized light, Quarter and half wave plates, Polaroids, Discussion on use of Polaroid sheets in preparing tinted sunglasses, Optical activity.

Unit IV:

Scattering of Light

A brief discussion on Tyndall effect, Rayleigh scattering and Raman effect. Blue of the sky and ocean. A qualitative account of fluorescence and phosphorescence. Raman effect: Classical and quantum theory of Raman effect, experimental method for studying Raman spectra, Raman spectrum, study of Raman effect using Lasers, intensity of Raman lines, Polarisation of Raman lines, characteristic properties of Raman lines, applications of Raman effect.

Unit V:

Introduction to Lasers: Spontaneous and stimulated emission, density of states, Einstein's A and B coefficients. Ratio of stimulated to spontaneous transitions in a system in thermal equilibrium, condition for amplification, population inversion, methods of optical pumping, energy level schemes of He-Ne and Ruby Laser. Properties and uses of Lasers.

Basic concepts of holography – construction of hologram – Discussion on the use of holograms in daily life - Recording and reproduction of holograms.

PRACTICALS

1. Determination of wavelength of mercury spectral lines using Diffraction Grating by normal incidence method
2. Determination of the refractive index of the material of a prism by minimum deviation method
3. Determination of Cauchy's constants using a prism, grating and spectrometer
4. Determination of the resolving power of a telescope
5. Determination of wave length of monochromatic light source using Bi-Prism
6. Resolving power of a grating
7. Wavelength and wavelength difference using a Michelson's interferometer
8. Determination of the thickness of paper by interference at a wedge
9. Determination of the radius of curvature of the lens by Newton's Rings
10. Determination of the refractive index of a liquid by Newton's rings
11. Verification of Brewster's Law
12. Refractive index of a prism by i-d curve

Textbooks:

1. N Subramanyam Brijlal: Waves and Oscillations, 2nd edition, Vikas Publishing house Pvt. Ltd., New Delhi.
2. A.B. Bhattacharya R. Bhattacharya, Under Graduate Physics, Volume I, New Central Book Agency (P) Ltd., Kolkata.
3. N. Subrahmanyam Brijlal and Dr. M.N. Avadhanulu: A text book of Optics, 24th revised edition - S. Chand & company Ltd, New Delhi

References:

1. Halliday/Resnick/Walker: Fundamentals of Physics, 8th edition, John Wiley & Sons (Asia) Pte. Ltd.
2. F A Jenkins and H E White: Optics, McGraw-Hill, 3rd Edition, (1957)
3. Khanna and Bedi: Sound
4. S K Gupta, O P Varma: Waves and Oscillations, 3rd edition, R. Chand & Co., New Delhi.
5. R.L. Saihgal, A Text Book of Sound, S. Chand & Company Ltd. New Delhi, Reprint 1990.
6. P.K. Mittal & Jai Dev Anand, A Text Book of Sound, Har-Anand Publications, New Delhi.
7. N V Suryanarayana: Electrical Measurements and Measuring Instruments, 1st edition, S. Chand & Co. Ltd., New Delhi.
8. H S Kalsi: Electronic Instrumentation, 2nd edition, Tata McGraw-Hill Publishing Co. Ltd., New Delhi.
9. D.R. Khanna and H.R. Gulati: Fundamentals of Optics, 15th edition - R. Chand publishers, New Delhi.
10. R. Murugesan Kiruthiga Sivaprasath: Optics and Spectroscopy, 17th revised edition - S. Chand & company Ltd, New Delhi

❖ **Mathematics Paper IV**

18MAT222MODERN ALGEBRA

3 1 0 4

Objectives: To enable students to understand fundamental concepts of algebra and apply results from elementary group theory to solve contemporary problems.

Unit I:

Introduction to Groups. Symmetries of a Square. The Dihedral Groups. Definition and Examples of Groups. Elementary Properties of Groups Finite Groups; Subgroups, Terminology and Notation. Subgroup Tests, Examples of Subgroups.
Chapters 2 and 3.

Unit II:

Cyclic Groups, Properties of Cyclic Groups. Classification of Subgroups of Cyclic Groups, Permutation Groups, Properties of Permutations, Isomorphisms, Definition and Examples. Cayley's Theorem, Properties of Isomorphisms.

Chapters 4-7.

Unit III:

Automorphisms, Cosets and Lagrange's Theorem, Application of Cosets to Permutation Groups. Normal Subgroups, Factor Groups, Applications of Factor Groups. Group Homomorphisms, Definition and Examples, Properties of Homomorphisms, The First Isomorphism Theorem.

Chapters 11-13.

Unit IV:

Rings-Motivation and Definition, Examples of Rings. Properties of Rings. Subrings. Integral Domains.
Chapters 23-24.

Unit V:

Quotient Rings and Ideals. Homomorphism of rings and rings of polynomials.
Chapters 28-30.

Textbooks:

1. A First course in abstract algebra, Johan B. Fraleigh, third edition, Narosa, 2000.

References:

1. Garrett Birkoff and Saunders Mac Lane, 'A Survey of Modern Algebra', Universities Press, 2003.

2. I. N. Herstein, 'Topics in Algebra', Second Edition, John Wiley and Sons, 2000.
3. M. Artin, 'Algebra', Prentice Hall inc., 1994.

❖ **Computer Science Paper IV**

18CSA213 DATA BASE MANAGEMENT SYSTEMS

3 0 2 4

Objective: To understand the role of a database management system in an organization by understanding basic database concepts, including the structure and operation of the relational data model. To construct simple and moderately advanced database queries using Structured Query Language (SQL) and to successfully apply logical database design principles, including E-R models and database normalization.

Unit I:

Database Management System model: Introduction, Implication of Database, Applications Database System; Data Independence; Data Modeling for a Database, Advantages and Disadvantages of Database Management System, DBMS Vs. RDBMS, Entities, Attributes, Relationships and Relationships Types.

Unit II:

Database System Architecture: Three Level Architecture of DBMS, The External Level or Subschema, The Conceptual Level or Conceptual Schema, The Internal Level or Physical Schema, Mapping; Database Management System Facilities, Data Definition Language, Data Manipulation Language; Database Manager, Database Administrator, Data Dictionary; Distributed Processing, Information and Communications Technology System (ICT), Client / Server Architecture

Unit III:

Relational Algebra: Basic Operations, Union, Difference, Intersection, Cartesian product; Additional Relational Algebraic Operations, Projection, Selection, JOIN, Division.

Database Models and Implementation: Data Model and Types of Data Model, Relational Data Model, Hierarchical Model, Network Data Model.

Entity-Relationship Model: E-R Diagrams, Notation used in E-R Model, Relationships and Relationship Types, Case study to implement E-R Diagrams.

Unit IV:

SQL: Categories of SQL Commands; Data Definition; Data Manipulation Statements, SELECT - The Basic Form, Subqueries, GROUP BY Feature.

Unit V:

Normalization: Functional Dependency; Anomalies in a Database; Properties of Normalized Relations; First Normalization; Second Normal Form; Third Normal Form; Boyce-Codd Normal Form (BCNF); Fourth and Fifth Normal Form.

Transaction Processing: Atomicity Consistency and Isolation, Durability, Transaction States.

References:

1. Silberschatz. Korth. Sudarshan: "Database System Concepts" 6th Edition McGraw-Hill International Edition
2. Ivan Bayross: "Sql- PL/SQL The Programming Language Of Oracle"- 4th Edition- BPB Publications

18EDU282

ICT IN EDUCATION0 1 2 2

Objectives:

On completion of the course, the student teacher will.

- develop skills to work on the application programs in MS Office Suite.
- become aware of the on-line services.
- applies the knowledge of computers across the school curriculum.
- prepare and present materials for day-to-day teaching-learning process.
- evaluates digital lesson plan/project/presentation
- uses computers as research, communication and publishing device.
- be aware of the meaning, nature and scope of ICT in Education.
- get acquainted with structure, hardware and software of computer.
- identify the changes that occur due to ICT in Education.
- prepare students to select the appropriate communication facilities through Internet.
- will have the awareness of legal and Ethical issues related to internet and student safety.
- would adopt the knowledge of ICT in teaching learning strategies.
- get acquainted with e-learning and its development in ICT.

Unit I:

Word Processor-MS Word and Spread Sheets-MS Excel

- 1.1 Document-creation of a new or opening of an existing file and saving
- 1.2 Entering text-editing and formatting-using insert options
- 1.3 Working with tables and drawing tools
- 1.4 Page setting and printing a document
- 1.5 Worksheet-creation of a new/opening of an existing /saving
- 1.6 Entering data-inserting and deleting rows, columns and worksheets- formatting
- 1.7 Use- sort- filter options and formulae functions
- 1.8 Inserting charts

Unit II:

Presentations- MS Power Point

- 2.1 Slide-creation of a new presentation or opening of an existing presentation -editing and saving
- 2.2 Enhancing the knowledge -slides using colors, backgrounds & templates
- 2.3 Inserting clipart, audio/video clips and Animating slides
- 2.4 Presentation of slides.

Unit III:

Uses of ICT in teaching and learning process& On-line services

- 3.1 Worldwide web-browsing, search engines, downloading, printing
- 3.2 Facilities available for Communication e-mail-creating, sending mails, and Attachments, checking, chat, online conferencing,
- 3.3 e-Library, websites, Blog, Internet forum, News Groups;
- 3.4 E - Learning , Virtual Classroom
- 3.5 Legal and copyright
- 3.6 Issues regarding downloading materials from Internet

Suggested Activities / Practicals / Tutorials

- Development self-instruction / Program instruction / computer assisted instruction material for any unit of any school subject of your choice.
- Discussion on legal and ethical issues regarding internet
- Policies on Cyber crimes
- Impact of ICT on socio-cultural, political and economic spheres.
- Prepare any programme pertaining to ICT

References:

- Assessment and Evaluations - P.G. Pnog
- Instructional system Design - Instructional Technology V.K. Rao
- Computer fundamentals - Arora Bansal
- Information and communication - Kishore, Chavan
- Information Technology - Dyne, Nandkishore
- Crumlish Christian - ABC o internet
- Fun of computer - Singh and Sukhvir
- ICT strategies of for school - MohentyLaxman
- Intel Teach to the Future pre-Service Version 2.0 manual
- Rajasekar, S (2005) Computer Education, Hyderabad; Neelkamal Publication
- Varanasi Lalini and others (2005) Computer Education, Hyderabad; Neelkamal Publication

❖ **Life Skills II- Same as in all UG Programmes at Amrita**

SEMESTER V

❖ Physics Paper V

18PHY305BASIC ELECTRONICS

3 0 0 3

Objectives :To enable students to understand the physics of semiconductors and their applications in basic electronic circuits.

Unit I:

Semiconductor Characteristics and Applications

Review : Intrinsic and extrinsic semiconductors, electrons and holes in intrinsic and extrinsic semiconductors, conduction by electrons and holes, conductivity of a semiconductor, Energy bands in semiconductors. Carrier concentrations in intrinsic and extrinsic semiconductors, Fermi level, donor and acceptor levels in extrinsic semiconductors.

P-N junction diode – depletion layer, conduction in PN junction diode, characteristics, diode resistance.

Half wave and full wave rectifiers, power output and efficiency, Ripple factors.

Breakdown in diodes – Zener breakdown, Zener diode characteristics and application in voltage regulation.

LEDs, photo diodes, LDRs and Solar cells.

Unit II:

Transistors and Applications

Bipolar junction transistor (PNP and NPN) transistors, different configurations and characteristics, current components in CE configuration, large signal and small signal dc current gains, transistor biasing – self bias circuit, Load line and operating point.

Transistor as an amplifier : Transistor as a two port device, h-parameters and analysis of CE amplifier using h parameter equivalent circuit, simplified h-parameter circuit, stabilization of voltage gain in CE amplifiers, Two stage amplifiers, RC coupling, frequency response of CE amplifier. Comparison of transistor configurations.

Emitter follower circuit and its use. Transistor as Power amplifier.

FET construction and its characteristics – MOSFET characteristics.

Concept of feedback in amplifiers and advantages of negative feedback

Unit III:

Basic Principles of sinusoidal oscillators, Statement and explanation of Barkhausen criterion for sustained oscillations, RC phase –shift Oscillator, explanation of : tank circuit and development of oscillations in an LC circuit, Hartley Oscillator, Colpitt's Oscillator, Wien Bridge Oscillator, Piezoelectric effect, Piezoelectric Oscillator..

Unit IV:

Digital Electronics

Binary to decimal and decimal to binary conversion, Binary addition and subtraction, Octal number system, Hexadecimal system and conversions.

Construction and working of AND and OR logic gates using diodes. Construction of NOT gate using transistor. Symbols and truth table for AND, OR, NOT, NAND NOR and Ex-OR logic gates. Boolean algebra, Boolean laws, D’morgan’s theorem. NAND and NOR as universal gates. Introduction to OP-AMP. Differential amplifiers, principle of OP-AMP, OP-AMP parameters, Applications – Addition, Subtraction, differentiation and integration.

Unit V:

Communication Electronics

Basic theory of amplitude modulation, Power in modulated carrier, single side band transmission, Basic idea of frequency and phase modulation. Modulated class C amplifier, demodulation, PN diode as demodulator linear and square law detection.

Propagation of radio waves, different layers of ionosphere and their functions,

Radio communication: Role of ionosphere in radio communication. Block diagram of Radio transmission. The block diagram and diagram of super heterodyne AM Receiver.

Textbooks:

1. V.K. Mehta: Electronics .
2. BapatYN : Electronic circuits and Systems, TMH , New Delhi.
3. RamakantGaekwad: Operational amplifiers and Linear Integrated Circuits, Prentice hall of India ltd, New Delhi.

References:

1. Concepts of modern physics, 6th Edition- A Beiser
2. Resnick: Special theory of relativity
3. A.P French: Special relativity
4. Malvino: Electronic principles , Fifth edition
5. C. Kittel: Introduction to solid state physics
6. A J. Dekkar: Solid State physics
7. J.B. Blackmore : Introduction to solid state physics
8. S V Subramanyam : Experiments in Electronics
9. R P Jain: Modern Digital Electronics
10. Malvino and Leach : Digital principles and applications
11. Grob B: Basic Electronics
12. Boylestead: Network analysis

❖ Physics Paper VI- Practical Paper

18PHY381 PRACTICAL0 1 2 2

(A minimum of ten experiments to be performed from the following list)

1. Junction diode characteristics
2. Zener diode characteristics
3. Junction Transistor characteristics
4. FET characteristics
5. Wien Bridge Oscillator.

6. UJT characteristics.
7. Full adder using AND, OR and XOR gates
8. Study of op-amp characteristics.
9. Measurement of efficiency and output power of LED.
10. Verification of the inverse square law for light intensity using a phototransistor.
11. Study of Optocoupler.
12. Study of Divergence of Diode laser.
13. Amplitude demodulator.
14. Logic gates – AND, OR, NOT, NOR and XOR using IC 7402

18EDU301PEDAGOGY OF PHYSICS2 0 2 3

OBJECTIVES

On completion of the course, the student teacher will

- acquire the knowledge of nature and Scope of Physics.
- analyse the importance of Physics in life, objectives and Values of Teaching Physics, content Categories of Physics, approaches and Methods of Teaching of Physics.
- develop the Skill of analysing Physics in terms of content and learning experiences
- stating objectives in behavioural terms
- appreciate the role of Physics in daily life.
- list out the different resources for Teaching Physics.
- develop the Skill of selecting and using appropriate media and materials while Teaching lessons in Physics
- preparing Learning Aids, conducting experiments and demonstrations in Physics

Course Content

Unit I:

Introduction

- 1.1 Meaning, Nature, Scope and Values.
- 1.2 Components of Scientific Knowledge-Process and Product.
- 1.3 Importance of Physics in daily life and growth of knowledge.

Unit II:

Planning and Approaches

- 2.1 General aims and objectives of teaching Physics.
- 2.2 Writing instructional objectives in behavioural terms (Blooms/Anderson's revised taxonomy)
- 2.3 Anderson's Constructivist base for lesson planning.

Unit III:

Methods of Teaching Physics

3.1 Approaches, methods and models of teaching.

3.2 Concept of correlation- incidental and systematic correlation of Physics -Interdisciplinary and intra disciplinary.

Unit IV:

Teaching and learning resources in Physics

4.1 Library Resources: Text books, Reference Materials

4.2 Laboratory, Importance and uses of Laboratory Manuals.

Unit V:

Technological and Communityresources in Physics

5.1 Technological resources: Audio-Visuals Materials, Virtual labs, Smart Class, Multimedia and E- learning resources.

5.2 Community resources and improvised aids.

Suggested Activities / Practicals / Tutorials/ Practicum

- Contribution of Scientists in the field of Physics .
- Physics as an integral part of science.
- Importance, Steps/features, Merits and limitations of Inductive and Deductive methods, Lecture cum Demonstration method, Problem solving method
- Identifying different components of scientific knowledge in the given context
- Development of scientific attitude among students
- Critical analysis of formulation of instructional objectives in behavioural Terms
- Construction of self-instructional materials
- Preparation of Power point presentation – Slides
- Planning and designing for Laboratory work
- Preparing the list of experiments to be conducted in the laboratory.
- Preparing lesson plan for different methods and models of teaching.

References:

- Gupta, S. N. (1985). *Teaching Physical Science in Secondary School*, New Delhi: Sterling Publishers.
- Chand, B. (1986). *Teaching of Science*, Ludhiana: Prakash Brothers.
- Sharma, R. C. (1987). *Modern Science Teaching*, Delhi: DhanpatRai and Sons.
- Das, R. C. (1985). *Science Teaching in School*, New Delhi: Sterling Publishers.
- Gibbs, K .(1996). *Advanced Physical science–Part I & II*, Cambridge: Cambridge University Press.
- Joyce, Bruce and Marsha Weil. (2000). *Models of Teaching* (4thEdn.), New Delhi: Prentice hall Inc.
- Kalara, R. N. (1981). *Innovations in Science Teaching*, Lucknow: Prakashan Kendra.

- Prasad, J. (2005). *Practical Aspects in Teaching of Science*, Kanishka Publishers.
- Siddiqui and Siddiqui. (1998). *Teaching of Science-Today and Tomorrow*, New Delhi: Doaba House.
- Sood, S. K. (1988). *New Directions in Science Teaching*, Delhi: Indian Publishers.
- Sudharshan, P. V. (1994). *A Manual of Science Club*. Sushma Publishers.
- Sund, R. B and Trawbridge, L. W. (1986). *Teaching Science by Inquiry in Secondary Schools*. Ohio: Charles and Merrill.
- □ Thurbar, W. A and Collette, A. T. (1964). *Teaching Science in today's Secondary School*. New Delhi: Prentice hall Inc.
- UNESCO. (1978). *New UNESCO Source Books for Science Teaching*. New Delhi: Oxford and IBH Publishing Co.
- UNESCO. (1986). *UNESCO Hand Book for Science Teachers*. Paris: UNESCO.
- Vadiya, N. (1968). *Problem Solving in Science*. Lucknow: S. Chand & Co.
- Wadhva, S. (2001). *Modern Methods of Teaching Physical science*. New Delhi, Swaroop & Sons.
- Yadav, R. S. (1998). *Teaching of Science*. New Delhi: Anmol Publications Pvt. Ltd.
- Zaidy, S. M. (2004). *Modern Teaching of Science*. New Delhi: Anmol Publications Pvt. Ltd.
- Lorsbach, A and Tobin K (2012). "Constructivist as a referent for Science Teaching".
- Printed in National Association for Research in Science Teaching (NARST).

18EDU303

PEDAGOGY OF CHEMISTRY

2 0 2 3

Objectives

On completion of the course, the student teacher will

- acquire the knowledge of nature and scope of Chemistry.
- analyse the importance of Chemistry in life, objectives and values of teaching chemistry, approaches and methods of teaching of Chemistry.
- develop the skill of analysing Chemistry in terms of content and learning experiences
- stating objectives in behavioural terms
- appreciate the role of Chemistry in daily life.
- list out the different resources for Teaching Chemistry.
- develop the Skill of selecting and using appropriate media and materials while Teaching lessons in Chemistry
- preparing Learning Aids, conducting experiments and demonstrations in Chemistry

Unit I: Introduction

1.1 Meaning, Nature, Scope and Values.

1.2 Components of Scientific Knowledge-Process and Product.

1.3 Importance of Chemistry in daily life and growth of knowledge.

Unit II: Planning and Approaches

- 2.1 General aims and objectives of teaching Chemistry.
- 2.2 Writing instructional objectives in behavioural terms (Blooms/Anderson's revised taxonomy)
- 2.3 5E base for lesson planning.

Unit III: Methods of Teaching Chemistry

- 3.1 Approaches, methods and models of teaching.
- 3.2 Concept of correlation- incidental and systematic correlation of physical sciences- Interdisciplinary and intra disciplinary.

Unit IV: Teaching and learning resources in Chemistry

- 4.1 Library Resources: Text books, Reference Materials
- 4.2 Laboratory, Importance and uses of Laboratory Manuals.

Unit V: Technological and Community resources in Chemistry

- 5.1 Technological resources: Audio-Visuals Materials, Virtual labs, Smart Class, Multimedia and E- learning resources.
- 5.2 Community resources and improvised aids.

Suggested Activities / Practicals / Tutorials/Practicum

- Contribution of Scientists in the field of Chemistry.
- Physical science as an integral part of science.
- Importance, Steps/features, Merits and limitations of Inductive and Deductive methods, Lecture cum Demonstration method, Problem solving method
- Identifying different components of scientific knowledge in the given context
- Development of scientific attitude among students
- Critical analysis of formulation of instructional objectives in behavioural Terms
- Construction of self-instructional materials
- Preparation of Power point presentation – Slides
- Planning and designing for Laboratory work
- Preparing the list of experiments to be conducted in the laboratory.
- Preparing lesson plan for different methods and models of teaching.

References:

- Chand, B. (1986). *Teaching of Science*, Ludhiana: Prakash Brothers.
- Das, R. C. (1985). *Science Teaching in School*, New Delhi: Sterling Publishers.
- Gupta, S. N. (1985). *Teaching Physical Science in Secondary School*, New Delhi: Sterling Publishers.
- Joyce, Bruce and Marsha Weil. (2000). *Models of Teaching* (4thEdn.), New Delhi: Prentice hall Inc.
- Sharma, R. C. (1987). *Modern Science Teaching*, Delhi: Dhanpat Rai and Sons.

- Siddiqui and Siddiqui. (1998). *Teaching of Science-Today and Tomorrow*, New Delhi: Doaba House.
- Sood, S. K. (1988). *New Directions in Science Teaching*, Delhi: Indian Publishers.
- Vadiya, N. (1968). *Problem Solving in Science*. Lucknow: S. Chand & Co.
- Yadav, R. S. (1998). *Teaching of Science*. New Delhi: Anmol Publications Pvt. Ltd.
- Zaidy, S. M. (2004). *Modern Teaching of Science*. New Delhi: Anmol Publications Pvt. Ltd.

❖ Mathematics Paper V

18MAT301REAL ANALYSIS

2 1 0 3

Objectives: To enable students to understand the basic properties of the field of real numbers and understand notion of continuous functions and their properties

Unit I:

Review:-Sets and Functions, Mathematical Induction, Finite and Infinite Sets.

The Real Numbers-The Algebraic and Order Properties of \mathbb{R} , Absolute Value and the Real Line, The Completeness Property of \mathbb{R} , Applications of the Supremum Property.

Chapter-2 (Sec.2.1-2.3)

Unit II:

Sequences and Series-Sequences and Their Limits, Limit Theorems, Monotone Sequences, Subsequences and the Bolzano-Weierstrass Theorem, The Cauchy Criterion, Properly Divergent Sequences, Introduction to Infinite Series.

Chapter-3 (Sec.3.1-2.6)

Review of Limits-Limits of Functions, Limit Theorems. (Chapter-4, review only)

Unit III:

Continuous Functions-Continuous Functions, Combinations of Continuous Functions, Continuous Functions on Intervals, Uniform Continuity.

Chapter-5 (Sec.5.1-5.4)

:

Unit IV:

Differentiation-The Derivative, The Mean Value Theorem, L'Hospital's Rules, Taylor's Theorem.

Chapter-6 (Sec.6.1-6.4)

Unit V:

The Riemann Integral- Riemann Integral, Riemann Integrable Functions, The Fundamental Theorem.

Chapter-7 (Sec.7.1-7.4)

Textbooks:

1. Introduction to Real Analysis, by Robert Gardner Bartle, Donald R. Sherbert, Fourth Edition, John Wiley and Sons, 2011.

References:

1. Mathematical Analysis by Tom M. Apostol, Second Edition, Narosa publishing house, New Delhi, 1989.
2. Principles of Mathematical Analysis by Rudin.W, Third Edition, McGraw-Hill International Editions, 1976.
3. Real Analysis by H.L. Royden and P.M.Fitzpatrick. Fourth Edition. Pearson Education Asia Limited, 2010.

❖ **Mathematics Paper VI**

18MAT112DISCRETE MATHEMATICS

1 1 0 2

Objectives: To enable students to understand the basics of logic, permutations and combinations and use effectively algebraic techniques to analyse basic discrete structures and algorithms.

Unit I:

Logic: Logic, Propositional Equivalence, Predicate and Quantifiers, Theorem Proving.

Chapter-1 (Sections: 1.1-1.5)

Unit II:

Basics of Counting, Pigeonhole Principle, Permutation and Combinations.

Chapter-4 (Sections: 4.1-4.3)

Unit III:

Advanced Counting Techniques and Relations: Recurrence Relations, Solving Recurrence Relations, Solutions of Homogeneous Recurrence Relations.

Chapter-6 (Sections: 6.1-6.2)

Unit IV:

Relations and Their Properties: Representing Relations, Closure of Relations, Partial Ordering, Equivalence Relations and partitions.

Chapter-7 (Sections: 7.1, 7.3-7.6)

Unit V:

Graph Theory: Introduction to Graphs, Graph Operations, Graph and Matrices, Graph Isomorphism, Connectivity, Euler and Hamilton Paths, Shortest Path Problems.

Chapter-8 (Sections: 8.1, 8.4-8.6)

Textbooks:

1. Kenneth H. Rosen, "Discrete Mathematics and its Applications", Tata McGraw- Hill Publishing Company Limited, New Delhi, Sixth Edition, 2007.

References:

1. R.P. Grimaldi, "Discrete and Combinatorial Mathematics", Pearson Education, Fifth Edition, 2007.
2. Thomas Koshy, "Discrete Mathematics with Applications", Academic Press, 2005.
3. Liu, "Elements of Discrete Mathematics", Tata McGraw- Hill Publishing Company Limited , 2004

❖ Computer Science Paper V

18CSA304INTRODUCTION TO DATA STRUCTURES AND ALGORITHMS 3 0 0 3

Objective: To enable the students to learn the Elementary Data Structures and algorithms and to understand the various design and analysis of the algorithms.

Unit I:

Introduction: Overview – How to create programs and analyze them. Arrays – Structures - Ordered List – Representation of arrays – Simple Applications.

Unit II:

Stacks and Queues: Fundamentals – Structures – Operations – Multiple stacks and queues – Applications - Evaluation of Expressions.

Unit III:

Linked Lists: Singly Linked List – Linked Stacks and Queues - The Storage Pool – Applications – Polynomial addition, Sparse Matrices – Doubly Linked List – Dynamic Storage Management – Garbage Collection and Compaction

Unit IV:

Searching and Sorting: Binary, Sequential and Fibonacci Searching – Internal Sorting: Insertion, Quick, Merge, Heap, Radix sorts – External Sorting: Sorting with Disks – K-way Merging – Sorting with Tapes – Balanced Merge – Poly-phase Merge – Symbol Tables – Static tree – Dynamic Tree – Hash Tables.

Unit V:

Files: Files, Queries and Sequential organization – Indexed Techniques – File Organization: Sequential, Random, Linked Organization – Inverted Files – Cellular Partitions. Introduction to trees and types.

Textbooks:

1. Fundamentals of Data Structures - Ellis Horowitz and Sartaj Sahni, Galgotia Book Source, 1999.

References:

1. Programming and Data Structures - Askok N Kamthane, Pearson Education, 2004.

❖ Computer Science Paper VI- Practical Paper

18CSA381DATA STRUCTURES ALGORITHMS LAB

0 1 2 2

1 Write a C program that uses functions to perform the following:

- a) Create a singly linked list of integers.
- b) Delete a given integer from the above linked list.
- c) Display the contents of the above list after deletion.

2 Write a C program that uses functions to perform the following:

- a) Create a doubly linked list of integers.
- b) Delete a given integer from the above doubly linked list.
- c) Display the contents of the above list after deletion.

3 Write a C program that uses stack operations to convert a given infix expression into its postfix Equivalent, Implement the stack using an array.

4 Write C programs to implement a double ended queue ADT using

- i) array
- ii) doubly linked list

5 Write a C program that uses functions to perform the following:

- a) Create a binary search tree of characters.
- b) Traverse the above Binary search tree recursively in Postorder.

6 Write a C program that uses functions to perform the following:

- a) Create a binary search tree of integers.
- b) Traverse the above Binary search tree non recursively in inorder.

7 Introduction to simple programs using Python

8 Write a Python program for implementing the following sorting methods to arrange a list of integers in ascending order:

- a) Insertion sort
- b) Merge sort

9 Write a Python program for implementing the following sorting methods to arrange a list of integers in ascending order:

- a) Quick sort
- b) Selection sort

18EDU302PEDAGOGY OF MATHEMATICS2 0 2 3

Objectives:

On completion of the course, the student teacher will

- acquire the knowledge of
 - nature and scope of mathematics.
 - history of mathematics.
- develop an Understanding about
 - values and objectives of teaching mathematics.
 - content categories of mathematics.
 - approaches and methods of teaching of mathematics
- develop Skill of
 - preparing lesson plan and unit lesson plan and year plan
 - critically analyze current mathematics text books
- appreciate
 - the role of mathematics in daily life.
 - contribution of Indians, Greeks and Arabs to mathematics.
 - structure of mathematics.
 -

Unit I:

Introduction

1.1 **Number system** , Set, Progression of numbers, Profit and Loss, Banking ,**Statistics**

1.2 Introduction to Algebra, Exponents ,Factorisation ,HCF and LCM ,Simultaneous , Linear Equations ,Variations

1.3 Introduction to Geometry ,Triangles, Polygons ,Quadrilaterals, Circles, Basic concepts of Trigonometry

Unit II:

Introduction to Teaching of Mathematics

2.1 Nature of Mathematics

- 2.2 Mathematics as a language
- 2.3 Use of Mathematics in daily life and other branches of study
- 2.4 Contribution of Indians, Greeks and Arabs to Mathematics
- 2.5 Value of History of Mathematics to a mathematics Teacher
- 2.6 Values of Teaching Mathematics

Unit III:

Planning for Teaching Mathematics

- 3.1 General Objectives of Teaching Mathematics at the Secondary School Level.
- 3.2 Writing Instructional Objectives in Mathematics
- 3.3 Preparation of Year Plan, Unit Plan and Lesson Plan(Constructivist Approach).
- 3.4 Content categories in Mathematics- : Concept and Facts.
- 3.5 Content analysis of secondary school mathematics curriculum.

Unit IV:

Approaches for Teaching Mathematics

- 4.1 Teaching of Concepts- Concept Attainment Model
- 4.2 Teaching of Generalizations-Inductive and deductive approaches
- 4.3 Problem Solving Approach

Unit V:

Resources for Teaching Mathematics

- 5.1 Printed Resources- Text books, Work books and Resource unit
- 5.2 Audio –Visual Resources & Computers.
- 5.3 Websites related to Mathematics Education.

Suggested Activities / Practicals / Tutorials/ Practicum

- Contribution to Indians and others to Mathematics
- Values of Teaching Mathematics
- Content categories in Mathematics
- Methods of teaching- steps and importance
- Resources for teaching mathematics
- Logical thinking in mathematics
- Formulating instructional objectives
- Preparation of unit plan and lesson plan
- Content analysis of the topics from state mathematics 8th and 9th text books
- Text book analysis- comparative study
- Developing workbooks
- Developing learning aids/transparencies

References:

- Brian, Bolt (2005) 101-Projects in Mathematics, London, Cambridge University Press.

- Burger, Edward B. & Starbird, Michael (1999) *The Heart of Mathematics*, California, Key College Publishers.
- Butler & Wren (1965) *The Teaching of Secondary Mathematics* London, MC Graw Hill book company.
- Cooney T. J. et al. (1975) *Dynamics of Teaching Secondary School Mathematics*, Boston, Houghton Mifflin.
- Eves, Howard (1962) *An Introduction to the History of Mathematics*, New York, Holt Rinehart and Winston Inc.
- Joyce, Bruce and Marsha Weil, (2000), *Models of Teaching* (4thEdn.), New Delhi: Prentice hall Inc.
- NCERT (1984) *Content cum Methodology of Teaching Mathematics*, New Delhi.
- NCERT (2000) *National Curriculum Frame Work for School Education*, New Delhi.
- NCERT (2005) *National Curriculum Frame Work*, New Delhi.
- NCTM (1971) *Evaluation in Mathematics*. New York. NCTM
- Polya, G, (1965), *Mathematical Discovery Vol I & II*, New York, John Wiley and Sons.
- Polya, G, (1985), *How to Solve it*, New Delhi, Prentice Hall, Private Ltd.
- Scopes, (1973) *Mathematics in Secondary Schools* Cambridge University Press
- Servais, W and Varga T (Eds) (1971) *Teaching School Mathematics*, Harmondsworth, PenguinBooks (UNESCO)
- Sidhu K.S. (2002) *The Teaching of Mathematics*, Bangalore, Sterling Publisher (Pvt.) Limited.
- Sudhir Kumar, (2002) *Teaching of Mathematics*, New Delhi, Anmol Publications Private Limited.

❖ **Open Electives**

SEMESTER VI

❖ Physics Paper VII

18PHY316 ATOMIC AND MOLECULAR PHYSICS

3 0 0 3

Objective : To enable students to apply the basic knowledge of classical and quantum mechanics at the atomic and molecular level.

Unit I:

X-Rays: Continuous X-ray spectra. Duane and Hunt limit. Characteristic X ray spectra, Moseley's law and its significance, X-ray energy levels.

Bragg's law and Bragg spectrometer. A brief mention of different types of crystals. Structures of NaCl and KCl crystals.

Compton Effect – Expression for Compton Shift.

Unit II:

Atomic Spectra:

The Electron : Determination of e/m of an electron by Thomson method, Determination of charge of an electron by Millikan's oil drop method.

Atomic Spectra : Inadequacy of Bohr atomic model, correction due to finite mass of the nucleus, Rydberg constant in terms of reduced mass, Excitation and Ionisation potentials, Franck-Hertz experiment, Bohr-Sommerfeld Model of atom, vector model of an atom, Electron spin, space quantisation, magnetic moment of an electron due to its orbital motion. Stern-Gerlach experiment and its theory.

Spin-orbit interaction and Fine structure of spectral lines. Quantum numbers and selection rules. Pauli's exclusion principle. Electronic configuration of atoms. Valence electron and a brief mention of L-S and J-J coupling for two electron atoms.

Unit III:

Zeeman effect: Introduction, experimental study of normal Zeeman effect, theory of normal Zeeman effect, expression for Zeeman effect, quantum theory of normal Zeeman effect, anomalous Zeeman effect, Paschen-Back effect and Stark effect.

Unit IV:

Molecular Spectra: Molecular formation, the H molecular ion, H₂ – molecule. Salient features of molecular spectra.

Rotation, vibration and electronic spectra of molecules, associated quantum numbers and selection rules. Theory of pure rotation and rotation- vibration spectra, Raman and IR spectra, simple applications.

Unit V:

Electromagnetic Theory And Maxwell's Equations: Displacement current, Setting up of Maxwell's equations in SI units, Hertz experiment, Travelling electromagnetic wave, Wave equations (qualitative and quantitative) – Energy transport and Poynting vector, Poynting theorem. A radiation pressure (Normal and Oblique incidence). Concept of electric dipole, magnetic dipole, expression for energy radiated by a dipole (No derivation)

Textbooks:

1. Atomic and nuclear physics -Littlefield and T.V. Thorley
2. Molecular spectra – G Herzberg
3. Fundamental university physics, vol. 3 – Aloson and Finn

References:

1. Perspectives of Modern Physics Beiser.
2. Electromagnetism, Reitz and Milford.
3. Concepts of modern physics, Fifth Edition- ABeiser
4. Introduction to modern Physics- F.R. Richtmeyer. E.H. Kennard and T. Lauritsen
5. Lasers – A K Gatak
6. Modern Physics - K.S. Krane
7. Introduction to modern Physics – H S Mani and G K Mehta

❖ Physics paper VIII
Practical Paper

18PHY382

PRACTICALS

01 2 2

(A minimum of eight experiments from the following)

1. Determination of Rydberg constant by studying the Fraunhofer spectrum
2. Analysis of powder X ray photograph
3. Study of the characteristics and spectral response of a photocell (selenium photocell)
4. Study of hydrogen spectrum
5. Analysis of band spectrum of PN molecule.
6. Analysis of rotational spectrum of nitrogen.
7. Analysis of rotational vibrational spectrum of a diatomic molecule (HBr).
8. Absorption spectrum of KMnO_4
9. Determination of dipole moment of an organic liquid
10. Spectral response of a photodiode and its I–V characteristics.

Objectives:**On completion of the course, the student teacher will**

- Develop the skill of analyzing the Physics content in terms of content and learning experiences
- State objectives in behavioural terms, prepare Year Plan, Unit Plan and Lesson Plan.
- Acquire the knowledge of professional Competencies of a Physical science Teacher.
- Conduct experiments and does demonstrations in Physics
- Construct Achievement and Diagnostic Tests, organise Co-Curricular Activities.

COURSE CONTENT**Unit I:****Co-Curricular Activities in Physics**

- 1.1 Meaning, Importance and organization of Science Club.
- 1.2 Organization of activities of Science Club - Field Visits, Science fair, exhibition, Museum, celebrating 'Days of Scientific Significance'.

Unit II:**Tools of Assessment in Physics**

- 2.1 Construction of an achievement test, Port folios, Checklists and rubrics
- 2.2 Different types of test items – merits and demerits.

Unit III:**Testing and Evaluation in Physics**

- 3.1 Diagnostic test and remedial teaching in Physics.
- 3.2 Evaluation through projects, seminars and assignments.

Unit IV:**Role of Teacher**

- 4.1 Qualities of a Physics Teacher
- 4.2 Competencies of a Physics Teacher

Unit V:

Professional Qualities of Teacher

- 5.1 Professional growth of a Physics Teacher.
- 5.2 Professional ethics of a Physics teacher.

Suggested Activities / Practicals / Tutorials

Tutorials:

- Preparation of blue print
- Preparation of Test Items.
- Preparation of a well-balanced question paper for 8th and 9th std
- Preparation of work book for existing 8th and 9th Physics text book
- Preparation of self-evaluation tool
- Preparation of different types of questions for different levels of learning and analysis
- Procedure to be followed for item analysis and its interpretation

Practicum

- Organization of a science club
- Organization of science fair, science competitions, field trips and exhibition with reference to Physics
- Expected and existing competencies of a Physics teacher
- Preparation of model question paper with blue print

Textbooks:

- Agarwal D.D.(2001). Modern Methods of Teaching Biological Science, New Delhi: Sarup & Sons.
- Chand, B. (1986). *Teaching of Science*, Ludhiana: Prakash Brothers.
- Monika Davar (2012). *Teaching of Science*, New Delhi: PHI learning private Ltd.
- Siddiqui and Siddiqui (1998). *Teaching of Science-Today and Tomorrow*, New Delhi: Doaba House.

References:

- Ameetha P. (2006). *Methods of Teaching Biological Science*, Hyderabad: Neelkamal Publications Pvt. Ltd.
- Anju Soni (2000). *Teaching of Science*, Ludhiana: Tandon Publications.
- Chikkara and Sharma (2000). *Teaching of Biological Science (Life Sciences)*, Ludhiana: Tandon Publications.
- Das, R. C. (1985). *Science Teaching in School*, New Delhi: Sterling Publishers.
- Ediger M and Rao D.B. (2003). *Science Curriculum*, New Delhi: Discovery Publishing House.

- Ediger M and Rao D.B. (2004). *Teaching Science Successfully*, New Delhi:Discovery Publishing House.
- Joyce, Bruce and Marsha Weil (2000). *Models of Teaching* (4thEdn.), New Delhi: Prentice hall Inc.
- Kalara, R. N. (1981). *Innovations in Science Teaching*, Lucknow: Prakashan Kendra.
- Miller, D. (1967). *Methods and Materials for Teaching Biological Sciences*. McGraw-Hill book Co.
- Myageri C.V.(2006).Teaching of Life Science, Gadag: VidyanidhiPrakashana
- Nanda V.K.(2002). Teaching of General Science in Elementary Schools, New Delhi: Anmol Publication Pvt. Ltd.
- Nanda V.K.(2004). Science Education Today, New Delhi: Anmol Publication Pvt. Ltd.
- RadhaMohan(2013). Innovative Science Teaching for Physical Science Teachers, New Delhi:PHIlearning private Ltd.
- Rao, C. B. and Lakshmi, G. B.(2004). *Methods of Teaching Life Sciences*, New Delhi : Discovery Publishing House.
- PromilaSharama (2009). Teaching of life science, New Delhi: A P H Corporation Ansari Road,DaryaGanj
- Sharma, R. C. (1987). *Modern Science Teaching*, Delhi: DhanpatRai and Sons.
- Siddiqui M. H. (2005). Teaching of Science, New Delhi: A.P.H.Publishing Corporation.
- SotiShivendra Chandra (2003). Contemporary Science Teaching, New Delhi: Surjeet Publications.

18EDU313

ADVANCED PEDAGOGY OF CHEMISTRY

2 0 2 3

Objectives:

On completion of the course, the student teacher will

- Develop the skill of analyzing the Chemistry content in terms of content and learning experiences
- State objectives in behavioural terms, prepare Year Plan, Unit Plan and Lesson Plan.
- Acquire the knowledge of professional Competencies of a Chemistry Teacher.
- Conduct experiments and does demonstrations in Chemistry
- Construct Achievement and Diagnostic Tests, organise Co-Curricular Activities.

Unit I: Co-Curricular Activities in Chemistry

- 1.1 Meaning, Importance and organization of Science Club.
- 1.2 Organization of activities of Science Club - Field Visits, Science fair, exhibition, Museum, celebrating 'Days of Scientific Significance'.

Unit II: Tools of Assessment in Chemistry

- 2.1 Construction of an achievement test, Port folios, Checklists and rubrics
- 2.2 Different types of test items – merits and demerits.

Unit III: Testing and Evaluation in Chemistry

- 3.1 Diagnostic test and remedial teaching in Chemistry.
- 3.2 Evaluation through projects, seminars and assignments.

Unit IV: Role of Teacher

- 4.1 Qualities of a Science Teacher
- 4.2 Competencies of a Science Teacher

Unit V: Professional Qualities of Teacher

- 5.1 Professional growth of a science Teacher.
- 5.2 Professional ethics of a Science teacher.

Suggested Activities / Practicals / Tutorials/Practicum

- Preparation of blue print
- Preparation of Test Items.
- Preparation of a well-balanced question paper for 8th and 9thstd
- Preparation of work book for existing 8th and 9th Physical science text book
- Preparation of self-evaluation tool
- Preparation of different types of questions for different levels of learning and analysis
- Procedure to be followed for item analysis and its interpretation
- Organization of a science club
- Organization of science fair, science competitions, field trips and exhibition with reference to Physical science.
- Expected and existing competencies of a Physical science teacher
- Preparation of model question paper with blue print

References:

- AnjuSoni(2000). Teaching of Science, Ludhiana: Tandon Publications.
- Chand, B. (1986). *Teaching of Science*, Ludhiana: Prakash Brothers.

- Das, R. C. (1985). *Science Teaching in School*, New Delhi: Sterling Publishers.
- Ediger M and Rao D.B. (2003). *Science Curriculum*, New Delhi: Discovery Publishing House.
- Ediger M and Rao D.B. (2004). *Teaching Science Successfully*, New Delhi: Discovery Publishing House.
- Joyce, Bruce and Marsha Weil (2000). *Models of Teaching* (4thEdn.), New Delhi: Prentice hall Inc.
- Kalara, R. N. (1981). *Innovations in Science Teaching*, Lucknow: Prakashan Kendra.
- Monika Davar (2012). *Teaching of Science*, New Delhi: PHI learning private Ltd.
- Nanda V.K.(2002). *Teaching of General Science in Elementary Schools*, New Delhi: Anmol Publication Pvt. Ltd.
- Nanda V.K.(2004). *Science Education Today*, New Delhi: Anmol Publication Pvt. Ltd.
- RadhaMohan(2013). *Innovative Science Teaching for Physical Science Teachers*, New Delhi: PHI learning private Ltd.
- Sharma, R. C. (1987). *Modern Science Teaching*, Delhi: Dhanpat Rai and Sons.
- Siddiqui and Siddiqui (1998). *Teaching of Science-Today and Tomorrow*, New Delhi: Doaba House.
- Siddiqui M. H. (2005). *Teaching of Science*, New Delhi: A.P.H.Publishing Corporation.
- SotiShivendra Chandra (2003). *Contemporary Science Teaching*, New Delhi: Surjeet Publications.
- Yadav M.S. (2004). *Modern Methods of Teaching Science*, New Delhi: Anmol Publishers.

❖ Mathematics Paper VII

18MAT632COMPLEX ANALYSIS

2 1 0 3

Objectives: To enable students to obtain knowledge of theory of complex functions of a complex variable and get acquainted with different methods and techniques of series and bilinear transformations

Unit I:

Definition, Algebra of complex numbers, polar forms, regions, Limits, continuity, differentiability Analyticity, CR equations, Harmonic Functions.

Chapters 1 & 2

Unit II:

Conformal mappings, bilinear transformations, Special bilinear transformations, fixed points.

Chapter-9 (Sections: 9.1-9.3)

Unit III:

Contour integral, Cauchy-Goursat theorem, Cauchy's integral formula, winding number, Primitives

Chapter-4 (Sections: 4.1-4.4, 4.7)

Unit IV:

Sequences, series, power series, uniform convergence of power series, Taylor's series, Laurent's series, Integration and differentiation of Power series.

Chapters- 5 & 6 (Sections: 5.1-5.2, 6.1, 6.3-6.5)

Unit V:

Zeros and singularities of analytic functions, types of singularities, poles, residue theorem.

Chapter-7 (Sections: 7.1-7.3)

Textbooks:

1. H S Kasana, Complex variables and Theory and Applications, second edition, Prentice Hall India

References:

1. S. Ponnusamy, *Foundations of Complex Analysis*, 2nd Edition, Narosa Publishing House, 2005.
2. J.W. Brown and R.V. Churchill, *Complex Variable and Applications*, McGraw Hill, 2008
3. R. Roopkumar, *Complex Analysis*, Pearson Education, 2014, Chennai

❖ **Mathematics Paper VIII**

Objectives: To enable students to understand the properties of probability and probability distributions and apply wide variety of specific statistical methods

Unit I:

Probability Concepts:

Important definitions- random experiment, trial, sample space, mutually exclusive events, independent events, dependent events, equally likely events, exhaustive events – approaches to measuring probability.

Unit II:

Random Variables.

Discrete and continuous random variables – discrete and continuous distribution functions- mathematical expectation..

Unit III:

Distributions: Standard distributions- discrete distributions Binomial, Poisson. Continuous distributions uniform, exponential, Normal distributions.

Unit IV:

Correlation:

Introduction to simple correlation - scatter plot and correlation coefficient, properties of correlation coefficient, rank correlation coefficient.

Unit V:

Regressions: Introduction to simple regression, regression lines.

Textbooks:

1. Ronald E. Walpole, Raymond H. Myers, Sharon L. Myers and Keying Ye, Probability and Statistics for Engineers and Scientists, 8th Edition, Pearson Education Asia, 2007.

References:

1. Douglas C. Montgomery and George C. Runger, Applied Statistics and Probability for Engineers, John Wiley and Sons Inc., 2005
Ravichandran, J. Probability and Statistics for engineers, First Reprint Edition, Wiley India, 2012.

❖ Computer Science Paper VII

18CSA314 SYSTEM PROGRAMMING AND OPERATING SYSTEM 3003

Objective: To inculcate knowledge on Operating System concepts and functioning of modern Operating System.

Unit I:

Language processors: introduction, languages processing activities, fundamentals of language processing, Assemblers- elements of assembly language programming, a simple assembly scheme. Compilers and interpreters- aspects of compilation, memory allocation, compilation of expressions, Linkers-relocation and linking concepts, design of a linker, self-relocating programs

Unit II:

Operating System Overview: Operating System Objectives and Functions – The Evolution of Operating Systems – Major Achievements – Developments Leading to Modern Operating Systems – Microsoft Windows Overview – Traditional UNIX Systems – Modern UNIX Systems – Linux. OS-Functions and Structure: Different Services of Operating System – Operating System Structure – Booting. Information Management: The File System - Device Driver.

Unit III:

Process Management: Process – Evolution of Multiprogramming – Context Switching – Process States – Process State Transitions – Operations on a Process.

Unit IV:

Memory Management: Introduction – Single Contiguous Memory Management – Fixed Partition Memory Management – Variable Partitions – Non-contiguous Allocation – Paging – Segmentation – Combined Systems – Virtual Memory Management Systems.

Unit V:

Distributed Processing, Client/Server and Clusters: Client/Server Computing – Distributed Message Passing- Remote Procedure Calls – Clusters –Windows Cluster – Sun Cluster – Beowulf and Linux Clusters.

Textbooks:

1. Operating Systems Internals and Design Principles – William Stallings, 5th edition, PHI.

2. Operating Systems – AchyutGodbole , 2nd edition, TMH.
3. System Programming and Operating Systems, 2nd edition, DM Dhamdhare.

References:

1. Operating Systems Concepts and Design – Milan Milankovic, 2nd edition, TMH.
2. Modern Operating Systems – Andrew S. Tanenbaum, 2nd edition, PHI.
3. Operating System Principles – Abraham Silberschatz, Peter Baer Galvin, Greg Gagne, 7th edition, Wiley India.
4. Operating System, Galvin, 6th edition

❖ **Computer Science Paper VIII**

18CSA382SYSTEM PROGRAMMING AND OPERATING SYSTEM LAB 0 1 2 2

1. Practicing A to Z bash commands.
2. Write a shell program to find the greatest and smallest of 3 numbers.
3. Write a program to find the factorial of a given number.
4. Write a shell program to find arithmetic operations using SWITCH.
5. Write a shell program to print the prime numbers between 1 and 300.
6. Write a shell program the check the given string is palindrome or not.
7. Write a shell program to display various patterns.
8. Write a shell script to display a list of files in the current directory to with read, write and execute permissions.
9. Write a shell script which works similar to word count command.
10. Write a shell script which will receive any number of file names as arguments. The shell script should check whether every argument supplied in a file or a directory. If it is a directory, it should be appropriately reported. If it is a file name, then the name of the file as well as the number of lines present in it should be displayed.

❖ **Case Studies**

18EDU312ADVANCED PEDAGOGY OF MATHEMATICS2 0 2 3

Objectives:

- On completion of the course, the student teacher will
- acquire the knowledge of Professional Competencies of a Mathematics Teacher.
- develop an Understanding about extended curricular activities for Teaching Mathematics.
- develop Skill of
 - Constructing Achievement and Diagnostic Tests.
 - Organizing Co-Curricular Activity.

Unit I:

Curricular Activities

- 1.1. Mathematics Projects.
- 1.2. Developing Mathematics Laboratory
- 1.3. Mathematics club

Unit II:

Recent trends in Mathematics

- 2.1 Co-operative Learning
- 2.2 Mathematics Olympiad
- 2.3 Use of Calculators, m- learning

Unit III:

Assessment in Mathematics

- 3.1 Construction of Unit Test
- 3.2 Preparation of Balanced question paper
- 3.3 Evaluation of Projects and Assignments
- 3.4 Diagnosis and Remediation – Diagnostic Test Construction.
- 3.5 National Talent Search Scheme.

Unit IV :

Mathematics Teacher

- 4.1 Qualities,
- 4.2 Professional Competencies

Unit V:

Professional Development

- 5.1 Professional Development: in-service Programmes, Continuing Education, Research Activities – Action Research,
- 5.2 Seminars, Workshops and Conferences
- 5.3 Teacher Associations – NCTM, AMTI, AISMTA

Suggested Activities / Practicals / Tutorials/Practicum

- Achievement test- concept and importance
- Diagnostic test
- Mathematics club activities
- Teacher associations-functions
- Review of articles related to mathematics teaching

- Interaction with students of other colleges of education.
- Conducting Action Research (Practice-in-teaching)
- Organizing mathematics quiz (Practice-in-teaching).

References:

- Brian, Bolt (2005) 101-Projects in Mathematics, London, Cambridge University Press.
- Burger, Edward B. & Star bird, Michael (1999) The Heart of Mathematics, California, Key College Publishers.
- Butler & Wren (1965) the Teaching of Secondary Mathematics London, MC Graw Hill book company.
- NCERT (1984) Content cum Methodology of Teaching Mathematics, New Delhi.
- NCERT (2000) National Curriculum Frame Work for School Education, New Delhi.
- NCERT (2005) National Curriculum Frame Work, New Delhi.
- NCTM (1971) Evaluation in Mathematics. New York. NCTM
- Polya, G, (1965), Mathematical Discovery Vol I & II, New York, John Wiley and Sons.
- Polya, G, (1985), How to Solve it, New Delhi, Prentice Hall, Private Ltd.
- Sidhu K.S. (2002) The Teaching of Mathematics, Bangalore, Sterling Publisher (Pvt.) Limited.

18EDU381SKILL DEVELOPMENT0122

1. Microteaching –

a. Core teaching skills:

- Skill of introducing a lesson
- Skill of explaining
- Skill of illustrating with examples
- Skill of fluency in questioning

b. Subject Specific Skills:

- Skill of drawing diagrams
- Skill of drawing mathematical constructions
- Skill of reading aloud
- Skill of stimulus variation

2. Practice of Communicative Skills

18EDU390

INTERNSHIP - I

During the first phase of internship the student teachers have to spend 4 weeks by visiting various government offices like DIET,BRC,BEO and to various residential and special schools. It includes the observation and recording of various functions happening in the offices, observing senior teachers classes, teaching learning process ,methodologies used in special schools and to familiarize with the existing educational scenario of the respective states. It shall provide for sustained engagement with learners and the school (including engaging in continuous and comprehensive assessment for learning), thereby creating a synergy with schools in the neighborhood throughout the course.

ASSESSMENT INDICATORS OF SCHOOL INTERNSHIP I

Internship Programme I

1. Visiting and recording information on various government offices and schools.
2. Reports on senior class teachers observation, facilities of the school , activities in the school both curricular and co-curricular)
3. Development of a tool to evaluate the classroom performance of teachers
4. Report writing
5. Presentation

SEMESTER VII

18EDU590

INTERNSHIP –II (Any two methodologies)

SCHOOL INTERNSHIP IN PHYSICS

Credit 5

Practice in Teaching in Physics consists of delivery of TWO (2) integrated lessons in simulated situation .Later during internship FIFTEEN (15) regular class-room lessons need to be delivered in the respective Schools selected for internship . Out of which five are based on constructivist approach, three innovative lessons, (ICT /CAM/ITM) one remedial lesson and later ends in a culminating lesson .

After the completion of all Fifteen (15) lessons a Practical examination is conducted. Thus each student teacher will have to complete FIFTEEN (15) lessons in Physical Science as ‘Term work’. The whole term work is evaluated for 150 marks.

SCHOOL INTERNSHIP IN CHEMISTRY

Credit 5

Practice in Teaching in Chemistry consists of delivery of TWO (2) integrated lessons in simulated situation .Later during internship FIFTEEN (15) regular class-room lessons need to be delivered in the respective Schools selected for internship . Out of which five are based on constructivist approach, three innovative lessons, (ICT /CAM/ITM) one remedial lesson and later ends in a culminating lesson .

After the completion of all Fifteen (15) lessons a Practical examination is conducted. Thus each student teacher will have to complete FIFTEEN (15) lessons in Physical Science as ‘Term work’. The whole term work is evaluated for 150 marks.

SCHOOL INTERNSHIP IN MATHEMATICS

Credit 5

Practice in Teaching in Mathematics consists of delivery of TWO (2) integrated lessons in simulated situation .Later during internship FIFTEEN (15) regular class-room lessons need to be delivered in the respective Schools selected for internship . Out of which five are based on constructivist approach, three innovative lessons , (ICT /CAM/ITM) one remedial lesson and later ends in a culminating lesson .

After the completion of all Fifteen (15) lessons a Practical examination is conducted. Thus each student teacher will have to complete FIFTEEN (15) lessons in Mathematics, as ‘Term work’. The whole term work is evaluated for 150 marks.

18EDU501

ASSESSMENT FOR LEARNING2 1 0 3

Objectives:

On completion of the course, the student teacher will

- gain a critical understanding of issues in assessment and evaluation
- become cognizant of key concepts, such as formative and summative assessment, evaluation and measurement, test, examination
- be exposed to different kinds and forms of assessment that aid student learning

- be acquainted with the use of a wide range of assessment tools and learn to select and construct these appropriately
- Evolve realistic, comprehensive and dynamic assessment procedures that are able to keep the whole student in view.

Unit I:

Assessment and Evaluation

- 1.1.Modality- assessment- measurement- test- examination- evaluation- marking scheme- ranking- grading and on- line examination
- 1.2.Purposes of assessment- assessment in a constructivist paradigm.
- 1.3.Classification of assessment- formative and summative, CRT (Criterion-Referenced Test) and NRT (Norm-Referenced Test); Peer assessment and Self- assessment.
- 1.4.Continuous and Comprehensive Evaluation.
- 1.5.Distinction between 'Assessment of Learning' and 'Assessment for Learning'

Unit II:

Assessment of Formal Learning

- 2.1.Taxonomy of educational objectives – Blooms and Anderson’s revised classification of objectives.
- 2.2.Assessment of cognitive learning-
- 2.3.Assessment of affective learning – attitudes, aptitude and interest; items and procedure for assessment.
- 2.4.Assessment of performance – Skill learning-Multitask.
- 2.5. Construction of a Unit test – three dimensional Blue print.

Unit III:

Assessment for Learning

- 3.1.Assessment for information as an input of learning.
- 3.2.Assessment devices- Assignments, projects, seminars, practical works, and performance based activities and reports.
- 3.3.Using assessment feedback for further learning.(both teacher and student)
- 3.4.Developing performance test (rubrics for portfolio assessment)
- 3.5.Organising and planning for student portfolios.

Unit IV:

Evaluation Mechanism and Examination System

- 4.1.Examination - Need and types, objectives and uses of objective test, achievement test, entrance test, paper pencil test, on-line examination, open book examination and question bank.
- 4.2.Critical analysis of prevailing examination system on student learners and stakeholders
- 4.3.Purpose of Examination grade placement.

- 4.4.Directions for Examination Reform: Introducing flexibility, improving quality of questions papers, Examination management, Scheme of valuation.
- 4.5.Analysis of test results -Alternative modes of certification, School-based credits, CBCS and Role of ICT in examination.

Unit V:

Data Analysis, Interpretation and Follow-up

- 5.1.Data Analysis – significance and uses-Presentation of data – tabulation and graphical representation-frequency polygon.
- 5.2.Analysis of data- Measures of central tendency, variability, relationship types and uses.
- 5.3.Normal Probability Curve- Characteristics and uses. Interpretation- Concepts of skewedness and Kurtosis.
- 5.4.Follow-up; Diagnosis and remediation

Suggested Activities / Practicals / Tutorials

- School visits followed by presentation on evaluation practices in schools.
- Data processing and interpretation of achievement test performance of school students.
- Presentation of papers on issues and concerns / trends in assessment and evaluation.
- Presentation of papers on examination and evaluation policies.
- One sessional test.
- Construction and administration of an achievement test - Classification, tabulation and graphical representation of data as well as interpretation of data.
- Construction and administration of a diagnostic test and suggesting appropriate remedial measures.
- Construction of observation schedule, rating scale, check lists, attitude scale, interest inventories.
- Development of a question bank.
- Critical analysis of question papers.
- Planning of other assessment tools.

References:

- Bransford, J., Brown, A.L., & Cocking, R.R. (Eds.). (2000). How people learn: Brain, mind, experience, and school. Washington, DC: National Academy Press.
- Burke, K. (2005). How to assess authentic learning (4th Ed.). Thousand Oaks, CA:

Corwin.

- Burke, K., Fogarty, R., &Belgrad, S (2002). The portfolio connection: Student work linked to standards (2nd Ed.) Thousand Oaks, CA: Corwin.
- Carr, J.F., & Harris, D.E. (2001). Succeeding with standards: Linking curriculum, assessment, and action planning. Alexandria, VA: Association for Supervision and Curriculum Development.
- Aggarwal J C (2003) Essentials of Examination System Evaluation, tests and Measurement. New Delhi: Vikas Publication House.
- Albert Oosterhof (2ndedn.) Classroom applications of Educational Measurement. New York: Merrill/Macmillan Publishing Company.
- Ebel (1964) Measurement and Evaluation.
- Garret H E (1971) Statistics in Psychology and Education, Bombay: VakilsFeffer, Simons (Pvt) Ltd.
- Gronlund, N E & Linn R L (8thedn.)(2003) Measurement and assessment in teaching, Singapore: Pearson Education.
- Payne. D A (2ndedn.) (2003) Applied Educational Assessment. Canada: Eadsworth (Thomas Learning).
- Ram Bahia Patel – Evaluation Theory and Practice...
- Popham, W J (1993) Educational Evaluation, New York: Allyn and Bacon.
- Thorndike, R L and Elizabet (1977) Measurement and Evaluation in Psychology & Education, New York: John Wiley.
- Vashisht S R (2002) Theory of Educational Measurement, New Delhi: Anmol Publications.

18EDU581UNDERSTANDING THE SELF0 1 2 2

Objectives

On completion of the course, the student teacher will

1. Understand self as a person and as a teacher (Professional identity).
2. Develop sensitivities, dispositions and skills which will help to facilitate personality of students.
3. Develop social relational sensitivity (develop desirable social relationships with students, colleagues, managers and parents and members of the community.
4. Develop resilience to deal with conflicts at different levels.
5. Learn to organize groups to draw collective strength to handle (solve) academic, personal and social (group) tensions / conflicts .
6. Develop a holistic and integrated understandings of human self and personality.
7. Identify self-identities (gender, relational, social cultural) and analyses one beliefs, stereotypes, prejudice, attitudes and values objectively.

Workshop session 1:-

Developing relational sensitivity (objective)

Subject Content:-

Meaning of social relational sensitivity, impact of community on individuals, social relationships with students, colleagues, administrators peers, parents and community, interaction between school/teachers and community role of emotional reaction in social relationships. conflict resolution at different levels (colleagues, students, parent, community) is using group efforts to resolve conflicts, creativity and group dynamics.

Activities:-

1. Discussion on how to develop positive social relationships among the peer, siblings, neighbors /community teacher and head master in the school context.
2. Analyse the social structure of a class-room using sociometry.
3. Listen to a recitation of a passage or a story building or a narration and record it after listening and evaluate the content listened. Submit it in a report form.
4. Analysis of greeting people on special occasions with special items – how and why – Report.
5. Social distance scale .

Workshop Session 2:-

Understanding the self-personality (objective)

Subject Content:-

Concept of self, identities of self as a person, personality development, social cultural influence on self-development, beliefs, attitudes and values.

Activities:-

1. Write a note on oneself consisting of perception of one's self (Who I am?); social cultural back-ground, one's beliefs, attitudes and values.
2. Watching a movie/ documentary about successful persons and analyse the influence of life-event on self-development.
3. Understanding one's ability to transfer learning using Bilateral Transfer of learning
4. Analyse the personality of individual using Eyesenck's Personality test.
5. Thematic Apperception test (TAT)

Workshop Session 3:-

Understanding the self-adjustment and mental health resolving conflicts.

Subject Content

Concept of adjustment and mental health. Different modes of resolving conflicts and Defense mechanisms.

1. Analyse self-adjustment using Bell's Adjustment Inventory.
2. Discussion on students' real life experiences to strengthen their mental health and personal adjustment.
3. Analyse a conflicting situation and reflect on the strategies adopted to solve item. Discuss the types of conflicts.
4. Identify the frustrating and depressed situations Come out with the strategies to resolve them.

Workshop Session 4:-

Intelligence and Creativity

1. Understanding the level of intelligence using Raven's Progressive matrices.
2. Discussion on different modes of intelligence, Emotional intelligence.
3. Creative work for self expression (writing a poem, story or drama relating to Understanding of self, critical analysis of one –self).
4. Production of creative work –Small group production and display – Example – painting, clay models, greeting cards, imitation jewelry, embroidery.

SEMESTER VIII

ELECTIVE

- 1. Educational Research**
- 2. Guidance and Counselling**
- 3. Vocational Education**
- 4. Health and Physical Education**

18EDU531EDUCATIONAL RESEARCH (Elective)

3 0 0 3

Objectives:

On completion of the course, the student teacher will

- acquire knowledge of research in the field of education
- know the fundamental principles and functions of educational research.
- review the educational research articles
- understand the steps involved in educational research
- develop a research proposal
- equip the students with the required knowledge about the ethical issues related to research
- explain a sampling design appropriate for a research study
- understand the use of different tools and techniques in educational research
- understand the role and use of statistics in educational research
- equip the students to prepare and to evaluate research reports

Unit I:

Introduction to Educational Research

- 1.1. Research – meaning, definition and its importance.
- 1.2. Educational research – meaning, definition, significance of educational research, need for scientific approach to research, kinds of educational research.
- 1.3. Steps of educational research – identification of a research problem, review of literature, formulation of objectives and hypothesis, finalization of research design, collection of data, analysis of data and interpretation and report of results.
- 1.4. Preparation of research proposal.

Unit II:

Research Ethics

- 2.1. Research Ethics – meaning and ethical treatment of participants

2.2. Ethical issues in educational research.

Unit III:

Research Designs

- 3.1. Research Design – meaning and criteria of a good research design
- 3.2. Quantitative research – historical research, case study and ethnography.
- 3.3. Qualitative research – survey and experimental research
- 3.4. Sampling – meaning, steps in sampling design, types of sampling design
- 3.5. Methods of data collection – types of data – primary data collection methods – observation, experimentation, simulation and interview.
- 3.6. Tools for collecting data – Questionnaire, observation schedules, rating scales.

Unit IV:

Analysis and Presentation of Data

- 4.1. Processing of data – Editing, coding, classification, tabulation,
 - 4.2. Graphical representation of data - frequency tables, mean, bar charts, pie charts, histograms, cross tabulation, other table based analysis, Descriptive and inferential statistics
- Measures of central tendency – mean, median, mode., Measures of variability – range, quartile deviation, standard deviation., Normal Curve., correlation., chi-square tests., Analysis of variance (ANOVA).
- 4.4. A brief introduction to hypothesis testing.

Unit V:

Report Writing and Presentation

- 5.1. Report - Introduction, meaning of report, types of reports.
- 5.2. Writing a report - Planning report writing, format of a research report, report writing stages,
- 5.3. Presentation.

Suggested Activities / Practicals / Tutorials

- Prepare a Research Proposal.
- Preparation, Try Out and finalization of a tool
- List out the ethical issues related with the research and conduct a discussion on it
- Participate and Present the paper in workshop, Seminar and Conferences.
- Identify a problem and submit an Action Research report.
- Select a topic of your choice and write Literature Review
- Preparation of Research report

References :

- Aggarwal, Y.P. (1998), *Statistical Methods*, Sterling, New Delhi.
- Aggarwal, Y.P. (1998), *The Science of Educational Research: A Source book*, Nirmal, Kurukshetra
- Best, John W. and Kahn James V (1995), *Research in Education*, Prentice Hall, New Delhi
- Burns, R.B. (1991), *Introduction to Research in Education*, Prentice Hall, New Delhi.
- Garrett, H.E. (1973), *Statistics in psychology and Education*, Vakils, Feffer and Simon, Bombay.
- Kerlinger, F.N. (1973), *Foundation of Behavioral Research*, Holt, Rinehart and Winston, New York.
- Koul, Lokesh (1988), *Methodology of Educational Research*, Vikas, New Delhi.
- Kurtz, A.K. and Mayo S.T. (1980), *Statistical Methods in Education and Psychology*, Narola, New Delhi.
- Mcmillan, James H. and Schumarcher, S. (1989), *Research in Education: A Conceptual Introduction*, Harper and Collins, New York.
- Mouly, A.J. (1963), *The Science of Educational Research*, Euroasia, New Delhi.
- Neuman, W.L. (1997), *Social Research Methods: Qualitative and Quantitative Approaches*, Allyn and Bacon, Boston.
- P. and BenjabinFruchter (1973), *Fundamental Statistics in Psychology and Education*, Mac GrawHill, New York.
- R.A.Sharma ;Fundamentals of Educational Research : Meerut ,Loyal Book Depot,2003
- R.P.Bhatnagar (Ed.) *Readings in Methodology of research in Education ;Meerut , R Lall Book Depot,2002*
- Travers, R,M.W. (1978), *An Introduction to Educational Research*, Macmillan, New York.
- Van Delen, D.B. (1962), *Understanding Educational Research*, Me Graw Hill, New York.
- Young, P.V. (1960), *Scientific Social Surveys and Research*, Prentice Hall, New York.
- Mc Burney, Donal H. (1994) *Research Methods*, Brooks/ cole publishing company, California

- Kumar, Ranjit (2011) Research Methods, Pearson Education, New Delhi
- KoulLokesh, Methodology of Education Research, vikas publishing house pvt. Ltd. Noida
- K V S Sharma, Statistics made Simple Do it Yourself on PC; New Delhi , Prentice Hall of India Private India Limited,2001
- M Rajamanikram; Statistical Methods in Psychological and Educational Research New Delhi,Concept Publishing Company,2001

18EDU532GUIDANCE AND COUNSELLING (Elective) 3 0 0 3

Objectives:

On completion of the course, the student teacher will

- take up minimum guidance programme at the high school level
- understand the history, principles, scope, needs of guidance and counselling
- acquaint with the knowledge of different techniques of guidance and counselling
- develop the skills of using the tools and techniques to know the abilities, interest of high school pupils
- explore the process of collection and dissemination of occupational information

Unit I:

Guidance

- 1.1 Guidance – Meaning, nature, principles uses with reference to schools.
- 1.2 Educational guidance–meaning, objectives, nature, scope, promotion of parental collaboration, role of Schools.
- 1.3 Vocational guidance- meaning, objectives, need and role of schools, peer and parents influence, societal needs.

Unit II:

Guidance Services

- 2.1. Guidance service in schools –Individual-Group, guidance bureau and its functions, Role of Head master and Career master, Organization of guidance programmes at the secondary school stage.
- 2.2. Types of Guidance Services –orientation, pupil inventory, placement, counseling and follow up.

2.3. Group guidance – meaning, advantages over individual guidance. Group guidance techniques, Group guidance programmes in schools – Orientation talks - Career Talks - Career Visits – Career Conference –Career Exhibition-Career resource center.

Unit III:

Tools and Techniques of Guidance:

- 3.1. Test and its benefit - intelligence –attitude - aptitude – interest - personality.
- 3.2. Tools and techniques for collecting data – observation, rating scales, anecdotal records, sociometry, case study, cumulative records, fact finding interview.
- 3.3. Self-Report - Personal data blank, autobiography, diary.

Unit IV:

Counselling

- 4.1. Counselling – meaning, nature, distinction between guidance and counselling, important features, steps of counselling process, different approaches of counselling - directive, non-directive, eclectic, Types of Counselling – Individual , Group –Group counselling process – Differentiate Group Guidance and Group Counselling-qualities and qualifications of a counsellor.
- 4.2. Basic skills in Counselling - observation, communication, making notes and reflections, interview, history, developing case histories of adolescence – physical/mental/emotional/social, documenting information, Analysis working with other professionals, further planning.

Unit V:

Counseling for Children with Special Needs

- 5.1. Ethics in counselling, legal responsibilities
- 5.2. Guidance and counselling for children with special needs- role of teacher in dealing students with special needs.

Suggested Activities / Practicals / Tutorials

- Differences between educational and vocational guidance.
- Discrepancies in Indian and Global counselling.
- Brief history of guidance movement in India
- Highlighting identifying adolescence problems.
- Conduct an action research on a problem that is most prevalent in schools which immediate attention of a guidance worker is needed and prepare a brief report –discipline, time concept, environment pollution and Personal hygiene.
- Construct a questionnaire to students for evaluating the guidance services of their school.

- Identifying learning difficulties in a particular subject.
- Visiting a school and identifying adjustment problems (children having negative attitude, low self-esteem, unable to get self-motivated etc.) and prepare a report.
- Preparation of an anecdotal record.
- Conduct mock counselling interview and prepare a brief report on it.
- Preparing rating scale (to evaluate participation in CCA)
- Visiting and reporting guidance service programmes in a school.
- Prepare a detailed outline of career talk in any institution
- Organizing career exhibition.
- Video presentation on career conference.
- Annual program of work for guidance and counselling activities for the students of Std. VIII, IX and X.
- Talk by a school counsellor.
- Role play representing directive, non-directive and eclectic counselling.
- Video presentation of the counselling session and discussion of the same.
- Prepare and administer a questionnaire on mental health of secondary school students and analyse the findings and submit an individual report.
- Identify children with special needs in any two schools and prepare a report.
- Peer pressure, mobile usage, pocket money, internet usage.

References:

- Aggarwal J.C. (1991) *Educational Vocational Guidance and Counselling*, New Delhi: Dubhai House.
- Asha Bhatnagar, Nirmala Gupta (first Edition 1999). *Guidance and Counselling*, Volume I; A Theoretical Perspective, New Delhi: Vikas publishing house.
- Asha K Kinra (2009) *Guidance and Counselling*, Dorling Kindersley (India) Pvt. Ltd
- Barki B.G. and Mukhopadhyaya B (1990), *Guidance and Counselling: A Manual*, New Delhi: Sterling Publishers.
- Chauhan S.S. (2012) *Principles and techniques of guidance* U.P: Vikas publishing house Pvt. Ltd.
- Crow and Crow (2008) *An introduction to guidance*, Delhi: Surjeet Publications.
- Fuster J.M. (1980). *Personal counselling*, Bombay: St. Paul Publications.
- Gupta S.K. (1980), *Guidance and Counselling in Indian Education*, New Delhi: NCERT
- Jones A.J. (1970), *Principles of Guidance*: New Delhi: McGraw Hill Publisher Co.
- Sharma R.N. (2008) *Vocational Guidance and Counselling*, Delhi : Surjeet Publication.

Objectives:

On completion of the course, the student teacher will

- acquire knowledge of the various aspects of vocational education in India.
- trace the development of vocational programme in India.
- appreciate the significant role of vocational education in increasing productivity.
- develop proper attitude towards vocational education.
- analyse the significant changes in the field of vocational education in India.
- analyse the various committees and report related to vocational education.

Unit I:**Introduction**

- 1.1 Vocational education – Meaning, Need and importance.
- 1.2 National Policy on Education in the programme of action in Vocational Education
- 1.3 Vocational education at Higher Secondary stage-objectives, course of study – list of vocations – syllabus, scheme of examination, allocation of periods, qualification and training of teachers for vocational education.
- 1.4 Human Resources Development – skilled manpower – productivity — Work experience-concept – distinction between work experience and vocational education.

Unit II:**Basic Education and S.U.P.W.**

- 2.1. Basic education – concept – merits – criticism, need and importance, scheme of multipurpose schools.
- 2.2. S.U.P.W. – Concept – Objectives – Selection of activities – programmes- advantages.

Unit III:**Models of Vocational Education**

- 3.1. Vocational education-Problems measures to improvement
- 3.2. Models of Vocational Education – School Model, Dual Model, Mixed Model.

Unit IV:**Vocational Education and Training**

- 4.1. Vocational education and training, correspondence and continuing education – need and Importance - in service programme-training for self – employment and small scale industry.

4.2. Training in Entrepreneurship-Government's Assistants

Unit V:

Role of Center and State Governments

- 5.1 The role and functions of center and state governments' vocational education and training DSERT, NCTE, ICAR, CSIR, SBTE and NCERT – funding agencies.
- 5.2 Vocational and Technical education in INDIA- Skill India - job oriented programs - significance -economic development

Suggested Activities / Practicals / Tutorials

- Secondary Education Commission (1952 – 53)
- Kothari Commission Report (1964 – 66)
- Ishwarbhai Patel Committee Report (1977)
- Malcolm Adiseshiah Committee Report (1978)
- Report of Kulandaisamy Group (1985)
- National Policy on Education in the programme of action in Vocational Education (1986)
- The role of center and state governments regarding vocational education and training. AICTE, DSERT, NCTE, ICAR, CSIR, SBTE and NCERT – their functions.
- Vocational and Technical education in INDIA, U.S.A. Russia and Japan.
- Vocational education and economic development – Vocational education in five year plans.
- Visits to places of any one of the small scale industries.
- Administer an Occupational Preference Inventory and report it.
- Preparation of Socially Useful Productive Work (SUPW) materials.
- Activities related to local visits and other activities.

References:

- Aggarwal J C and S P Aggarwal, Vocational Education, Doaba House Publishers, New Delhi, 1987.
- Aggarwal J.C., Marks in the History Modern Indian Education, Indian Education, Vikas Publishing House Pvt. Ltd., New Delhi, 1994.
- Secondary Education Commission (1952 – 53)
- Kothari Commission Report (1964 – 66)
- Sharma A.P., Contemporary Problem Education, Vikas Publishing House Pvt. Ltd, New Delhi, 1984.
- TarunRashtriya, Vocational Education, APH Publishing Corporation, New Delhi, 2005

Objectives:

On completion of the course, the student teacher will

- understand the concept of holistic health, its various dimensions and determinants and the importance of sports and yoga for development of holistic health
- develop positive attitude towards health as individual and be collectively responsible to achieve it
- know the health status, identify health problems and be informed for taking remedial measures
- become aware about rules of safety in hazardous situation (illness, accident and injury) and equip them with first aid measures about common sickness and injuries
- develop right habits about exercise, games and sports, sleep, rest and relaxation
- become sensitized, motivated and acquire with the skills for physical fitness, learn correct postural habits and activities for its development
- practice of yogasanas and meditation through which learns the skills/art of self-control, concentration, peace and relaxation to avoid ill effects of stress, strain and fatigue of routine life
- understands and develops skills to deal with psycho-social issues including those, related to process of growing up during adolescence, HIV/AIDS and substance abuse
- Understands various policies and programs related to health, physical education, *yoga* and help them to understand the process of assessment of health and physical fitness.

Unit I:**Health Education programme**

- 1.1 Health- Concept , importance, dimensions and determinants of health; physical and mental health
- 1.2 Health needs - importance of keeping good health children and adolescents, including differently-abled children
- 1.3 Understanding of the body system—central nervous system, skeleton, muscular, respiratory, circulatory and digestive –coordination and cooperation

Unit II:**Food and Nutrition-**

- 2.1. Food habits-their functions of nutrition
- 2.2. Diversity and variety foods, preservation of food value during cooking, indigenous and modern ways to preserve food,

- 2.3. Change in food habit of globalization-changing life style
- 2.4. Awareness of food hygiene preservation and consumption.
- 2.5. Choice and consumption of healthy diet- need and importance. Causes of food decay micro-organization

Unit III:

Physical Education

- 3.1. Physical activity - sports and Games - athletics (general physical fitness exercises), games (lead-up games, relays and major games), rhythmic activities, gymnastics and their impact on health
- 3.2. Yogic practices — importance of yoga, yogasanas, kriyas and pranayama and meditation, Sthitaprajna
- 3.3. Physical fitness, strength, endurance and flexibility, its components, sports skills, indigenous and self-defense activities-relationship between physical fitness and good food

Unit IV:

Health Issues

- 4.1. Health problems and communicable diseases- causes, prevention and cure
- 4.2. Role of first aid- safety and security .

Unit V:

Role of Institutions and Health Services

- 5.1. Role of institutions- school and family.-voluntary organization impact on body and mind (16/02/2016)
- 5.2. Health services, Health insurance policies and major health and physical education-related programmes,
- 5.3. Blood banks, role of media.

Suggested Activities / Practicals / Tutorials

1. Giving first aid.
2. Organizing Intramural activities.
3. Marking Playground.
4. Flag hoisting and de-hoisting.
5. Making physical aids for propagating health education.
6. Components of balanced diet. Components of food.
7. Pollution.

8. Advantages of yoga.
9. Postural Deformities.
 - Effectiveness of exercises.
 - Safety measures in home, school and playground.
 - Drawing fixtures.

References:

- Behari and Choudhary (1996) Text Book on Health and Physical Education. New Delhi :KalyaniPublishers.
- Ludhiana. David J Anspaugh, Gene Equal (2001) Health Education. Benjamin Cummings - SanFrancisco.
- Nanda V.K (2004), Health Education, New Delhi: Anmol Publications Pvt, Ltd.
- Ramachandran L & Dharmalingam, (2003), Health Education, New Delhi: Vikas Publishing House, Pvt, Ltd.
- Venkataiah S, (2004), Health Education, New Delhi: Anmol Publications Pvt, Ltd.
- Rao. V.K, (2004) Physical Education, New Delhi: APH Publishing Corporation.
- Vijendrakumar, (2000) Modern Methods of Teaching Physical Education, New Delhi: Saruand sons.

18EDU511

KNOWLEDGE AND CURRICULUM 2 0 0 2

Objectives:

On completion of the course, the student teacher will

- reflect on the nature and role of disciplinary knowledge
- facilitate learner to construct knowledge through various disciplines.
- analyze the nature of each discipline connected with the curriculum
- identify different disciplines connected with school education
- investigate the emergence of each existing discipline in the school education
- reflect on the nature and role of curriculum
- explore the present status of disciplines in the school curriculum
- analyze the modern societal demand for various disciplines
- create interdisciplinary curriculum
- analyse the different approaches to curriculum development
- explain the learner, constructivist, activity based centered approaches
- analyse modern concerns of curriculum
- distinguish between knowledge and skill, teaching and skill - knowledge and information
- identify various dimensions of the curriculum and their relationship with the aims of education

Unit I:

Knowledge and Disciplines

- 1.1 Knowledge – concept, nature, importance.
- 1.2 Distinction between – Knowledge and Wisdom, Knowledge and Skill, Knowledge and Information, Teaching and Training, Reason and Belief.
- 1.3 Discipline- concept, role, need.

Unit II:

Knowledge resources accumulation

- 1.1 Knowledge generation- Modes - Activity ,Discussion – Dialogue
- 1.2 Impact of Modernization and democracy.
- 1.3 Modern Values – equity- equality- social justice- scientific temper- environment- dignity.
- 1.4 Concept of Nationalism, Universalism and Secularism and their relationship with education

Unit III:

Nature importance and development of School Curriculum

- 3.1 Nature-Meaning and importance of Curriculum – Syllabus and distinction
- 3.2 Types of curriculum.
- 3.3 Approaches to curriculum development. -Subject centered, teacher centered, Learner centered, Dialogue centered, Activity based approaches.

Unit IV:

Curriculum Construction

- 4.1 Principles and Components
- 4.2 Impact of policies in curriculum construction
- 4.3 Preparation of text books-children’s literature-teachers’ handbooks .

Unit V:

Agencies of curriculum

- 5.1 Role of agencies in curriculum development- State and National level - DSERT, NCERT, CBSE, NCTE, UGC, NIEPA, and Universities.
- 5.2 Role of School formal agency.

Suggested Activities / Practicals / Tutorials

- Critical analysis of existing curriculum at primary and secondary levels and their assessment.
- Revising curriculum based on global market needs.
- Teachers handbook its need and content.
- Different modes of knowledge generation
- Subject-centered, learner- centered, activity centered
- Constructivist approach to teaching.
- Hidden curriculum and its role
- Case studies of schools. (Curriculum)
- Observation in schools and other field visits.
- Panel or group discussion on issues in education.
- Recording of observations and experiences of various culture groups.

References:

- Green S K and R L Johnson (2011), “Assessment is Essential” New York; Mc GrawHill.
- Vijaykumar R (2011), “Technology: A Catalyst of Teaching-Learning Process” *Edutracks*, 18(11), 3-5. Published in India.
- Passi B K, *Becoming Better Teacher – Microteaching Approach*, The center of advanced study in education, The M S University of Baroda.
- Dewey J (1993). *How we think: a restatement of the relation of reflective thinking to the educative process*. Chicago: Henry Regnery.
- Etuk E N et al. (2011). *Constructivist Instructional Strategy*. In *Bulgarian Journal of Science and Education Policy*, Vol 5, No. 1, 2011.
- Jonaseen D, Peck K L, Wilson B G, (1999). *Learning with Technology: A Constructivist perspective*. New Jersey; Prentice Hall.
- Von Glasersfeld E (1989), *Cognition, Construction of knowledge and teaching synthesis*. 80 (1), 121-140.
- Von Glasersfeld E (1990), *Constructivism in education*. In a Lewy (Ed.) *The International Encyclopedia of curriculum*. Oxford. Pergamon London: Falmer Press.
- Von Glasersfeld E (1996), *Aspects of Constructivism*. In C T Fosnot (Ed.), *Constructivism: Theory, Perspectives and Practice*. New York, N Y Teachers College Press, Columbia University.
- Vygotsky L S (1986). *Thought and Language*. Cambridge. Massachusetts. MIT press.
- Yager R (1999). *The Constructivist Learning model, towards real reform in Science education*. *The Science Teacher* 58 (60, 52-57)

Objectives:

On completion of the course, the student teacher will

- comprehend the meaning of School Management and highlights the basic principles of School Management.
- justify the need for institutional planning
- infer the need of maintaining different school related records
- reflect critically on supervision of school, staff and activities.
- generate a plan on the institutional functions.
- evaluate the existing infrastructure and functioning of the school
- describe the administrative structure of the State Board of Education
- differentiate the function of a teacher and the Head of the Institution
- prepare and maintain the school records

Unit I:**School Management**

- 1.1 School Management – Concept, meaning, principles, importance, distinction between Administration, Management and Supervision
- 1.2 Administrative Head – Qualities, Duties and Responsibilities,
- 1.3 Supervision and Inspection – Meaning, importance, types and procedure - Accountability – meaning and need.
- 1.4 Physical Infrastructure – Availability, adequacy and utilization, management of space, constraints and suggested strategies to overcome it, Concept of School plant.

Unit II:**Planning of School Management and School Activities**

- 2.1 Institutional planning – Meaning, need, importance, steps and areas
- 2.2 School records and registers – need, importance and maintenance.
- 2.3 Calendar of events and School timetable – importance, types, preparation and principles involved in their construction.
- 2.4 Concept of School complex – meaning, purpose, functions and advantages - Role of SDMC.
- 2.5 Co-curricular activities – Meaning – importance - planning and principles.
- 2.6 Parent Teacher Association – Formation - role- importance and school organization

functions.

Unit III:

Teacher

3.1 Teacher- Teacher as a facilitator, counselor - community leader - second parent and guardian

3.2 Professional skills and competencies of teachers.

3.3 Class room management – concept, principles, influencing factors and technique of class room management, importance of discipline.

Unit IV:

Action Research

4.1 Action Research – Meaning, scope, importance, identification of problem in school and classroom, steps involved in action research.

4.2 Teacher as a researcher

Unit V:

Role of Voluntary, Government and Non-Government Organisation

5.1 Educational Administration –Role and hierarchy (NCERT, DSERT, DIET)

5.2 Structure of State Educational Administration and Supervision – external and internal hierarchy

5.3 Role of different boards in monitoring , supervising - supervision report-educational ladder (DDPI, Block Education Office)

Suggested Activities / Practicals / Tutorials

- A critical study of the working of parent-teacher association in any two secondary schools.
- Preparation of an institutional plan.
- A critical survey of co-curricular activities in a secondary school.
- Preparation of an action plan and its implementation.
- A critical study of school health programmes in a secondary school.
- A critical survey of school records maintained in a secondary school.
- Preparation of school time table
- Preparation of an academic calendar/school calendar
- Analysis of the changed scenario in the inclusive school and prepare a report on it.
- Teacher competencies, Service record
- Head of the Institution
- Teacher Accountability for quality improvement

- Role of CCA.
- Activities facilitating all round development of students.
- Structure of Administration of State and Central (Comparative Study)

References:

- Agarwal J C (2006) Essentials of Educational Technology: Innovations in Education, New Delhi: Vikas Publishing House.
- Bhatia R L & Ahuja B N (2002) School organization and management, New Delhi: Surjeet Publications.
- Dash B N (2nd edn) (2004) School Organisation Administration and Management, Hyderabad: Neelkamal Publications.
- Jain Purabi (1st Edn) (2004) Educational Technology, Delhi: Dominant Publishers and Distributors.
- Joyce B & Weil M (5th edn.) (2005) Models of Teaching, New Delhi: Prentice Hall.
- Kochhar S K (2002) Secondary School Administration, New Delhi: Sterling Publishers Ltd.
- Mangal D K (2001) Foundations of Educational Technology, Ludhiana: Tandon Publications.
- Mohanty J (1st edn) (2003) Educational management Supervision School Organisation, Hyderabad: Neelkamal Publications.
- Mohanty J (1st edn) (2003) Modern trends in Educational Technology, Hyderabad: Neelkamal Publications.
- Myageri C V (1st edn) (1993) Text Book of Educational management, Gadag: VidyanidhiPrakashana
- Myageri C.V (1st edn) (1994) Educational Technology, Gadag: VidyanidhiPrakashana
- Verma Romesh and Sharma K Suresh (1st Edn) (2003) Modern Trends in Teaching Technology, Delhi: Anmol Publications.
- Yadav N (2003) A handbook of Educational Technology, New Delhi: Anmol Publications.
- Sultan Mohiddin and Siddhalingaih

18EDU513

EDUCATION IN CONTEMPORARY INDIA

2 1 0 3

Objectives:

On completion of the course, the student teacher will

- develop an understanding of the concept and aims of education.
- acquire an awareness of the development of education in India.
- analyse the divergent philosophies behind education and their implications.
- analyse the diversities, unifying factors, constitutional provisions
- appreciate the role of education in national development.

- comprehend the integral relationship between education and society.
- comprehend the nature of contemporary Indian society-social, economic and political environment-with reference to the educational systems.
- get acquainted with various levels of education in India.
- develop proper attitude towards solving social and academic problems in the school today.
- explore the significant role to be played by teachers as agents of social change in India.

Unit I:

Education as an evolving concept

- 1.1 Concept and Aims of Education
- 1.2 Education in India - Ancient, Medieval and Western systems of education in India (Macaulay's Minutes and Wood's Dispatch), Education Commissions in pre Independence India(Hunter's Commission, Sargent Report)
- 1.3 Relationship between Philosophy and Education
- 1.4 Contributions of Indian Philosophers in Education - Swami Vivekananda, Rabindranath Tagore, Mahatma Gandhiji and SarvepalliRadha Krishnan

Unit II:

Constitutional provisions related to education

- 2.1 Directive Principles of State Policy, Fundamental Rights and Duties
- 2.2 Articles related to education (15, 16, 17, 19, 21, 21a, 24, 28, 29, 30, 45, 350,350a)
- 2.3 Constitutional values related to education.

Unit III:

Policies and Programmes

- 3.1 University Education Commission (Radhakrishnan commission 1948-49), Secondary Education Commission (Mudaliar Commission 1952-53), Indian Education Commission (Kothari Commission 1964-66).
- 3.2 NPE 1986, Revised NPE (1992)
- 3.3 Sarva Shiksha Abhiyan (SSA) - Akshara Dasoha, Nali – Kali, Chaitanya, Edu sat.
- 3.4 RMSA, RTE Act (2009), RUSA, Role of DIET's, NCERT, DSERT and NCTE.
- 3.5 Higher education system- structure and role of UGC and NUEPA

Unit IV:

Diversities in India

- 4.1 National and emotional integration
- 4.2 Indian society - Unity in diversity, inequality and marginalization.
- 4.3 Languages and media of instruction in schools

Unit V:

Education in the global context

- 5.1 Liberalization, Privatization and Globalization in education (L.P.G.)- Implications for quality and expansion
- 5.2 Education as investment – Human resource development
- 5.3 Education for international understanding

Suggested Activities / Practical's / Tutorials

- Ongoing programmes of Elementary and Secondary Education introduced by Government of Karnataka and at National Level.
- Indian concept of Education.
- Contribution of Swami Vivekananda, Rabindranath Tagore, Mahatma Gandhiji and Sarvepalli Radha Krishnan to the development of education.
- National Educational Policies - 1968 - 1986 - 1992
- Role of MHRD.
- Study any one of the State and Centrally Sponsored schemes of education and submit a report on it.
- An analysis of the present educational situation in India in terms of policies of the Government\ reservation\ vocationalisation etc. and present a report on it with suggestive measures to improve the present status.
- A study of hurdles in fulfilling the Constitutional provision in respect of article 15,16,17,18,19,2,21a,28,29,30 and 45,350 and 350a.
- Critical Analysis of the implication of Right to Education Act – 2009
- Collect and interpret the data regarding the output of SarvaShikshanaAbhiyana (SSA)
- Discuss the comments/views on on-going programmes AksharaDasoha, Nali – Kali, Chaitanya, Edu sat.
- Conduct a seminar on the Aims and objectives of “RastreeyaMadyamikaShikshanaAbhiyana (RMSA).

References:

- Dewey J (1966). *Democracy in Education*, New York: Macmillan Publishers.
- Dewey J (1967). *Experience and Education*, Touchstone, New York.
- Dewey John (1956). *The Child and the Curriculum and 'School and Society'* Chicago, Illinois, USA: University of Chicago Press.
- Gandhi MK (1956). *Basic Education*, Ahmedabad: Navajeevan Publishers.
- Govt of India, MHRD (1986, revised 1992). *National Policy on Education*, New Delhi.
- Kuppaswamy B. (1980). *Social change in India*, Delhi: Vikas Publication House.
- Mohanty .J. (1988). *Indian Education in the Emerging Society*, Bangalore: Sterling Publishers.
- NCERT (1985). *Teacher and Education in Emerging Indian Society*, New Delhi, NCERT.
- Taneja V. R. (1985). *Educational thought and practice*, New Delhi: Sterling Publishers.
- UNDP Human Development Reports. New Delhi. Oxford: Oxford University Press
- Yadav and Yadav (1990) *Education in Emerging Indian Society*, New Delhi, Tandon Publications
- De, A., Khera, R., Samson, M., & Shiva Kumar, A.K. (2011). PROBE revisited: A report on elementary education in India. New Delhi: Oxford University Press.
- Govinda, R. (2011). Who goes to school? Exploring exclusion in Indian education. Oxford University Press.
- Ilaiyah, K. (1996). Why I am not a Hindu: A Sudra critique of hindutva philosophy, culture and political economy. Samya Publications.
- Letter to a teacher: By the school of Barbiana.(1970). Retrieved from <http://www.arvindguptatoys.com/arvindgupta/letter.pdf>
- NCERT. (2005). National curriculum framework. NCERT.
- NCERT. (2006a). Position paper-National focus group on education with special needs (NCF 2005).New Delhi: NCERT.
- NCERT. (2006b). Position paper-National focus group on gender issues in the curriculum (NCF 2005). NCERT.
- NCERT. (2006c). Position paper-National focus group on problems of scheduled caste and scheduled tribe children (NCF 2005). New Delhi: NCERT.
- NCERT. (2006d). Position paper-National focus group on teaching of Indian language (NCF 2005).New Delhi: NCERT.
- The PROBE Team. (1999). Public report on basic education in India. Delhi: Oxford University Press.
- https://en.wikipedia.org/wiki/Fundamental_Rights,_Directive_Principles_and_Fundamental_Duties_of_India
- pathshala.nic.in/wp-content/doc/NCF/Pdf/teacher_edu_final.pdf