

Bachelor of Arts and Bachelor of Education
Chhindwara University, Chhindwara (M.P)

COURSE OF STUDIES

For

Four Year Integrated

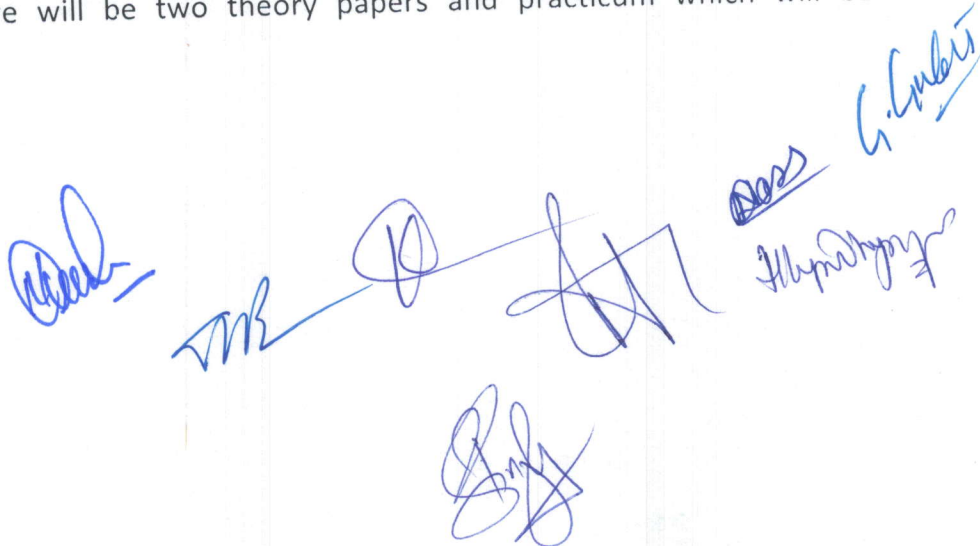
B.Sc. B.Ed (Eight Semester) Course

SIXTH SEMESTER

Subject/Paper	Paper	Intern.	Total	Pds./week
B.Sc Part:	40	10	50	3
Entrepreneurship Dev. II				
Elective I +Practical	60+25	15	100	9
Elective II +Practical	60+25	15	100	9
Elective III +Practical	60+25	15	100	9
Total	295	55	350	
B.Ed Part	60	15	75	3
P.C. I: Physical Science				
P.C. II: Bio/Maths	60	15	75	3
Gender Issues & Peace Education	40	10	50	3
Schooling, Socialization & Identity	40	10	50	3
Total	200	50	250	
Grand Total	495	105	600	

- Elective 1 – Physics/Botany
- Elective 2 – Chemistry
- Elective 3 – Zoology/Mathematics

(All the elective will have one theory paper and external practical examination except Mathematics where there will be two theory papers and practicum which will be valued internally)



Semester Name	Paper	Mark	Paper Code	Name of Papers
VI	Paper Theory-XI	30	M-6.1	Metric Spaces
	Paper Theory-XII	30	M-6.2	Linear Algebra
	Internal Test	15		Related To Above Papers
	Practicum	25		Related to Above Papers

B.Sc. Component:

Foundation Course: Entrepreneurship Development – II

Contact Periods/week: 03

Maximum Marks – 40

Min. Pass Marks – 13

Internal – 10

Unit I : Entrepreneurship: Meaning, Concept, Characteristics of entrepreneur, Qualities of Successful Entrepreneurs

Unit II: Types of entrepreneurship, importance and views of various thinkers (Scholars)

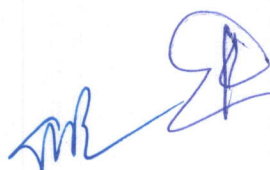
- Formation of goals, How to achieve goals.
- Problems in achieving targets and solution.
- Self motivation, elements of self motivation and development.
- Views of various scholars, evaluation, solutions.

Leadership capacity: Its development and results.

Unit III: Projects and various organisations (Govt., non-Govt.), Govt. Projects, Non- Govt. projects, Contribution of Banks, their limitations, scope.

Unit IV: Functions, qualities, management of a good entrepreneur, Qualities of an entrepreneur (Modern and traditional), Management skills of the entrepreneur, Motive factors of the entrepreneur.

Unit V: Problems and Scope of the Entrepreneur : -Problem of Capital -Problem of Power - Problem of Registration -Administrative problems -Problems of Ownership.


G. Gulati
Boss



Elective I – Physics

Paper VI: Solid State Devices and Electronics

Contact Periods/week: 05 + 4 Practical

Maximum Marks – 50

Min. Pass Marks – 25

Internal – 15 (Theory 10 & Practical 5)

Practical – 25 (External)

Note- At least one question will be set from each unit. 20% of the maximum marks will form simple numerical problems and another 20% would be for objective questions with a provision to provide reasoning. All Questions will have 100% internal Choice.

Objectives: After completion of this course the students will be able to

- 1) Understand the theory of semiconductor devices and its applications
- 2) Analyse graphically the characteristic of transistors in different modes
- 3) Understand the working of field effect transistor, MOSFET and its applications
- 4) Understanding the usefulness of amplifiers, their working and use in electronic circuit.
- 5) Understanding the concepts of Digital electronics and construction of simple digital circuits

Unit -1: Solid State Devices

Semiconductors ; intrinsic semiconductors, Fermi level, temperature dependence of electron and hole concentrations; extrinsic semiconductors: doping, impurity states, electronic transport in semiconductor, PN Junction, Diode equation and diode equivalent circuit. Junction Breakdown- Zener breakdown, Zener diodes, Tunnel diode, Diode Rectifiers and rectification, light emitting diode, Schottky diode, photovoltaic cell, Hall effect and its uses.

Introduction to Nanotechnology and properties of selected Nano materials, Nano electronics

Unit 2: Network Analysis and basic digital electronics

Kirchoff's laws, constant current and voltage sources, Superposition, Norton, Thevenin, maximum transfer theorem, Network elements, Bode Plots, Boolean algebra: Binary number systems; conversion from one system to another system: binary addition and subtraction. Logic Gates AND, OR, NOT, NAND, NOR exclusive OR: Truth tables; combination of gates. Morgan's theorem, Logic families.

Unit- 3: Transistors

Characteristics of transistors in CB, CE and CC mode, low frequency equivalent circuits, h - parameters, bias stability (emitter follower biasing and voltage divider biasing), loadline, thermal runaway, field effect transistor, JFET, MOSFET.

Unit-4: Amplifiers and Oscillators

Single stage amplifiers, Multistage amplifiers, RC coupled amplifier, gain frequency response, input and output impedance, transformer coupled amplifiers, Feedback in amplifiers, types of feedback, voltage gain of feedback amplifier, advantages of negative feedback, oscillators, Barkhausen criteria for oscillations, classification of oscillators, Introduction to OPAMP and applications: adder, subtractor, differentiator & integrator.

Unit 5: Modulation and Laser & Fiber Optics

Modulation and its need, Basic theory of amplitude modulation, Power in amplitude modulated wave, Drawbacks of amplitude modulation, Frequency modulation, Comparison between amplitude modulation and frequency modulation

Lasers: Properties of lasers, types of lasers, derivation of Einstein A & B Coefficients, components of lasers, Working of He-Ne and Ruby lasers.

Fibre Optics: Light guidance through optical fibre, types of fibre, acceptance angle and acceptance cone, numerical aperture, V-Number, Fibre dispersion, block diagram of fibre optic communication system.

Applications of laser and optical fibers.

Practical List

1. To draw the characteristic of semiconductor diode and calculate its forward resistance.
2. To draw the characteristic of Zener diode in reverse bias voltage.
3. Zener diode as voltage regulator
4. To draw the input and output characteristic of NPN/PNP transistor in the Common emitter configuration
5. To verify Thevenin's theorem.
6. To verify Norton's theorem
7. To verify Maximum Power transfer theorem.
8. To verify the superposition theorem.
9. To verify De-Morgan's law.
10. To study the OR, AND, NOR, NAND & NOT, logic gates & verify the truth table.
11. Study of OPAM as adder, differentiator, integrator.
12. Study of RC Coupled amplifier.
13. Study of h parameters of a transistor.

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14. To determine hall voltage, hall coefficient and free charge carrier density of a given sample.

Suggested Readings

- Digital Principles and applications by A.P. Malvino and Donald P. Leach
- Electronics: Analog and Digital by I. J. Nagrath
- Modern Digital Electronics 4E by R.P. JAIN
- Handbook of Electronics by S.L. Gupta and V Kumar

Elective I – BOTANY

Paper VI: Plant Physiology and Biochemistry

Contact Periods/week: 05 + 4 Practical

Maximum Marks – 60

Min. Pass Marks – 20

Internal – 15 (Theory 10 & Practical 5)

Practical – 25 (External)

Note- Two questions will be set from each unit and students are required to attempt one question from each unit

Objectives: To provide an understanding of Biochemical and physiological phenomena at functional and molecular level.

Unit I: Basics of enzymology : Discovery and nomenclature; Nature and characteristics of enzymes; concept of holoenzyme, apoenzyme, coenzyme and cofactors; regulation of enzyme activity; mechanism of action.

Unit II: Plant – Water relations : Importance of water to plant life; physical properties of water; diffusion and osmosis; absorption, transport of water and transpiration; physiology of stomatal movement.

Mineral nutrition : Essential macro and micro-elements and their role; deficiency symptoms, mechanism of mineral uptake.

Transport of organic substances: Mechanism of phloem transport; source-sink relationship; factors affecting translocation.

Unit III: Photosynthesis : Historical aspects; photosynthetic pigments; action spectra and enhancement effects; concept of two photosystems; Z-scheme; photophosphorylation; Calvin cycle; C-4 pathway; CAM plants; photorespiration. Significance of photosynthesis.

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Respiration : Aerobic and anaerobic respiration, kreb's cycle; electron transport mechanism (chemi- osmotic theory); Redox potential; oxidative phosphorylation; ATP the biological currency? Pentose phosphate pathway.

Unit IV: Nitrogen and lipid metabolism :

Biology of nitrogen fixation; importance of nitrate reductase and its regulation; ammonium assimilation; structure and function of lipids; fatty acid biosynthesis; β -oxidation; saturated and unsaturated fatty acids; storage and mobilization of fatty acids.

Unit V: Growth and development :

Definitions; phases of growth and development; Kinetics of growth ; seed dormancy, seed germination and factors of their regulation; plant movements; the concept of photoperiodism; physiology of flowering; Florigen concept; biological clocks; physiology of senescence, fruit ripening; plant hormones- auxins, gibberellins, cytokinins, abscisic acid and ethylene. history of their discovery, biosynthesis and mechanism of action; photomorphogenesis; phytochrome and cryptochrome, their discovery, physiological role and mechanism of action

Practical

Objectives:

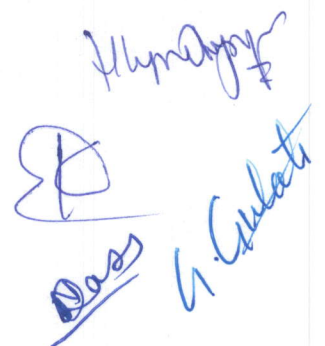
1. To impart the skills of handling and setting up of apparatus to conduct plant physiological experiment, collection of data and interpretation of results.

Plant Physiology

1. To study the permeability of plasma membrane using different concentrations of organic solvents inorganic salts.
2. To study the effect of temperature on permeability of plasma membrane.
3. To prepare the standard curve of protein and determine the protein content in unknown samples.
4. To study the enzyme activity of catalase and analyse as influenced by pH and temperature.
5. Comparison of the rate of respiration of various plant parts.
6. Separation of chloroplast pigments by solvent method and chromatography.
7. Determining the osmotic potential of vacuolar sap by plasmolytic method.
8. Determining the water potential of any tuber (potato).







9. Separation of amino acids in a mixture by paper chromatography and the identification by comparison with standards.
10. Bioassay of auxin, cytokinin, GA, ABA and ethylene using appropriate plant material.
11. Demonstration of root and shoot formation from the apical and basal portion of stem segments in liquid/solid medium containing different hormones.

Scheme of Practical Examination

1. Performing a plant physiology experiment, collection and interpretation of data. 5
2. To perform the given biochemical test. 5
3. Comment upon the experiment set before you. 5
4. Viva-voce 5
5. Sessional and practical record. 5
6. Internal evaluation 5

Suggested Readings

- Salisbury, F.B. and Ross, C.W., 2005, Plant Physiology (4th Edition)
- CBS Publishers & Distributors
- Taiz L. and Zeiger E., 2003, Plant Physiology (2nd Edition)
- Parina Publishing Lorpin, New Delhi
- Mohr, H and Schofer, P. 1995, Plant Physiology, Springer Verlag, Berlin Germany
- Noggle G.R. and Fritz, G.J. 2003 Introductory Plant Physiology, Narosa Publishing House, New Delhi
- Mulcherji, S. and Ghosh A.K. 2006 Plant Physiology, New Central Book Agency, New Delhi
- Sinha R.K. 2004, Modern Plant Physiology Narosa Publishing House, New Delhi

Elective II – CHEMISTRY

Paper VI

Contact Periods/week: 05 + 4 Practical

Maximum Marks – 60

Min. Pass Marks – 20

Internal – 15 (Theory 10 & Practical 5)

Practical – 25 (External)

Note: Two questions will be set from each Unit and the candidates will be required to attempt

Objectives: After completion of this course the students will be able to

- (i) Gain detailed knowledge about hard and soft acid and bases and appreciate the role of this concept in the learning of inorganic chemistry.
- (ii) Learn silicones and phosphazenes as inorganic polymers and assess the significance of the bonding parameters in them.
- (iii) Get a comparative view of the valence bond theory and crystal field theory in explaining the behaviour of the complex species.
- (iv) Enumerate the factors affecting the thermodynamic stability of the complex species.
- (v) Give explanation about the magnetic and spectral behaviour exhibited by various complex species.
- (vi) Appreciate the role of organometallic chemistry in the industry.
- (vii) Assess the role of metals ions with special reference to alkali and alkaline earth metals in various biological processes.

Instructional Strategy:

In dealing with the Hard and Soft Acids and bases, the teacher may make use of Ausubel's advance organiser model. Use of ICT may be ensured in dealing with silicones and phosphazenes. Bonding in complexes, thermodynamic stability of complexes, magnetic and spectral properties associated with the complexes be dealt with keeping in focus the cognition needs of the learner through problems solving and intentionally arousing cognitive conflict. Organometallic chemistry may be transacted keeping in focus the structured parameters. Inorganic chemistry may be learnt through posters sessions wheresoever posters are prepared to highlight metabolic paths.

UNIT - I (A) Hard and Soft Acids and Bases (HSAB) : Classification of acids and bases as hard and soft. Pearson's HSAB concept, acid-base strength and hardness and softness. Symbiosis, theoretical basis & hardness and softness, electronegativity and hardness and softness.

(B) Silicones and Phosphazenes: Silicones and phosphazenes as examples of inorganic polymers, nature of bonding in triphosphazenes.

UNIT - II

(A) Metal-ligand Bonding in Transition Metal Complexes: Limitations of Valence bond theory, an elementary idea of crystal-field, crystal field splitting.

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in octahedral, tetrahedral and square planar complexes, factors affecting the crystal-field parameters.

(B) Thermodynamic and Kinetic Aspects of Metal Complexes: A brief outline of thermodynamic stability of metal complexes and factors affecting the stability, substitution reactions of square planar complexes.

UNIT - III

(A) Magnetic Properties of Transition Metal Complexes: Types of magnetic behaviour, methods of determining magnetic susceptibility, spin-only formula, L-S coupling, correlation of μ_s (spin only) and μ_{eff} values, orbital contribution to magnetic moments, application of magnetic moment data for 3d-metal complexes.

(B) Electron Spectra of Transition Metal Complexes: Types of electronic transitions, selection rules for d-d transitions, spectroscopic ground states, spectrochemical series, Orgel-energy Level diagram for d^1 and d^2 states, discussion of the electronic spectrum of $[Ti(H_2O)_6]^{3+}$ complex ion.

UNIT - IV

Organometallic Chemistry: Definition, nomenclature and classification of organometallic compounds, Preparation, Properties, bonding and applications of alkyls and aryls of Li, Al, Hg, Sn and Pb, a brief account of metal-ethylene complexes and homogeneous hydrogenation, mononuclear carbonyls and the nature of bonding in metal carbonyls.

Organometallic Compounds: Organomagnesium Compounds: The Grignard reagents: formation, structure and chemical reactions.

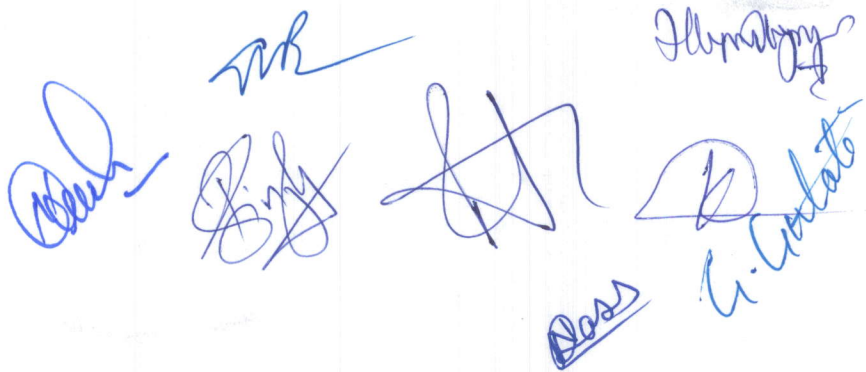
Organozinc compounds: Formation and chemical reactions.

Organolithium compounds: Formation and chemical reactions.

Organosulphur Compounds: Nomenclature, structural feature, methods of formation and chemical reactions of thiols, thioethers, sulphonic acids, sulphonamides and sulphaguanides.

Synthetic Polymers: Addition or chain-growth polymerization. Free radical vinyl polymerization, ionic vinyl polymerization, Ziegler-Natta polymerization and vinyl polymers.

Condensation or step growth polymerization. Polyesters, polyamides, phenol formaldehyde resins, urea formaldehyde resins, epoxy resins and polyurethanes. Natural and synthetic rubbers.



UNIT - V

Bio-Inorganic Chemistry: Essential and trace elements in biological processes, metalloporphyrins with special reference to haemoglobin and myoglobin. Biological role of alkali and alkaline earth metal ions with special reference to Ca^{2+} , Nitrogen fixation.

Practical:

1. Gravimetric Analysis
 - a. Analysis of Cu as CuCNS .
 - b. Analysis of Ni as Nickel dimethylglyoxime.
 - c. Analysis of Ba as BaSO_4
2. Separation Techniques
 - a. Separation of Mg^{2+} (and Fe^{3+}) by solvent extraction.
 - b. Separation of Mg^{2+} (and Zn^{2+}) by ion exchange.
3. Synthesis and Analysis
 - a. Preparation of sodium trioxalatoferrate(III) (and determination of its composition by permanganometry).
 - b. Preparation of Copper(II) tetramine complex.
 - c. Preparation of cis and trans bisoxalodiaquedichromate(III) complex.
4. Colorimetry
 - a. Job's Method
 - b. Mole-ratio Method
 - c. Determination of KMnO_4 in given solution
 - d. Determination of $\text{K}_2\text{Cr}_2\text{O}_7$ in given solution.

Suggested Readings

1. Cotton, P.A., G. Wilkenson, G. and Gaus, P.L., Basic Inorganic Chemistry, John Wiley and Sons, New York.
2. Lee, J.D., Concise Inorganic Chemistry ELBS
3. Sharpe, A.G., Inorganic Chemistry, ELBS
4. Malik, Madan and Tuli, Modern Inorganic chemistry, S. Chand and Company Ltd.
5. Douglas, Bodie E., Concepts and Models of Inorganic chemistry
6. Malik, Madan and Tuli, Advanced Inorganic Chemistry S. Chand and Company Ltd.
7. Huheey, James E., Inorganic Chemistry 4th Ed - New Delhi: Pearson Education.



8. Manku, G.S., Theoretical principles of Inorganic Chemistry, Tata McGraw - Hill Publishing Company, New Delhi
9. Soni, P.L., Textbook in Inorganic chemistry (a modern approach) Sultan Chand and Sons, New Delhi;

Elective III - ZOOLOGY

Paper VI: REPRODUCTIVE BIOLOGY, DEVELOPMENTAL BIOLOGY AND ENDOCRINOLOGY.

Contact Periods/week: 05 + 4 Practical

Maximum Marks - 100

Min. Pass Marks - 20

Internal - 15 (Theory 10 & Practical 5)

Practical - 25 (External)

Note: Two questions will be set from each Unit and the candidates will be required to attempt one

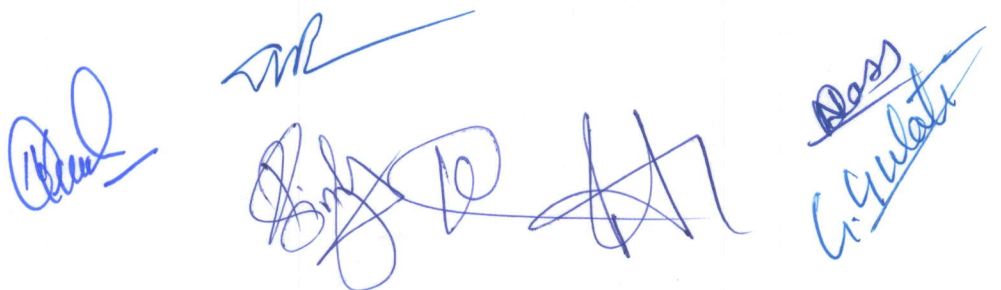
Objective - To study reproductive biology, developmental biology, various endocrine glands their structure and function.

Unit-1.

1. Reproductive system in mammals
2. Gametogenesis, structure of sperm and ovum.
3. Physiology of reproduction and fertilization in mammals.(with special reference to human)
4. Estrous cycle and menstrual cycle
5. Pregnancy, parturition and lactation.

Unit-2.

1. Types of animal eggs.
2. Cleavage pattern.
3. Development of chick embryo up to formation of primitive streak.
4. Extra embryonic membranes and fate map of frog and chick.
5. Placentation in mammals.



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Unit-3.

1. Concept of competence.
2. Cell determination.
3. Cell differentiation and regeneration.
4. Parthenogenesis.

Unit-4

1. Hormones their classification and mechanism of action.
2. Receptors, primary and secondary messengers and signal transduction.
3. Study of hypothalamus and pituitary gland.
4. Hypothalamo-hypophyseal portal system, pituitary hormones and their functions.

Unit-5.

1. Structure and function of Thyroid and Parathyroid gland.
2. Structure and function of Thymus.
3. Structure and function of Islet of Langerhans.
4. Structure and function of Adrenal gland.
5. Hormones released by gonads and their function.

PRACTICAL

Objective - To develop the skills to study embryonic developmental stages of animals reproductive physiology and endocrinology.

1. To study developmental stages of chick through whole mount, section and models.
2. Study of developmental stages of frog -whole mount section and models.
3. Window preparation of avian egg.
4. Identification of endocrine gland.
5. Identification and study of extra-embryonic membranes, fate map through charts and models.
6. Identification and study of Placentation in mammal through charts and models.
7. Study and identification of gonads. (permanent slides)
8. Study of estrous cycle and menstrual cycle through charts and handouts.

SCHEME OF PRACTICAL EXAMINATION

- | | | |
|---|---|----|
| 1. Spotting | - | 10 |
| 2. Window Preparation | - | 05 |
| 3. Exercise based upon reproductive cycle / | | |

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Placemation	-	03
4. Practical Records	-	03
5. Viva-voce	-	04

Referred books-1

1. Animal Physiology - Eckert and Frennann
2. Animal Physiology - Chatterjee
3. General and Comparative Physiology - William S. Hoar
4. Principles of Animal Physiology - Wood.
5. Endocrinology - Hadley.
6. Mammalian Physiology - Cluyston & Hall.
7. Developmental Biology - V.B. Rastogi
8. Chordate Embryology - Arora.
9. Embryology - Ballinsky.
10. Molecular Development - Wolpert.
11. Comparative Anatomy - Prosser.

Elective III - Mathematics

Contact Periods/week: 05 + 4 Practicum

Maximum Marks - 30+30=60

Min. Pass Marks - 20

Internal - 15 (Theory 10 & Practicum 5)

Practicum - 25 (Internal)

M - 6.1: METRIC SPACES

NOTE: Two questions will be set from each unit with Internal choice

Objectives: To develop the understanding of the basics of Topology and modern analysis

Unit - I
Definition and examples of metric spaces. Neighbourhoods. Limit points. Interior points. Open and closed sets. Closure and interior. Boundary points. Sub-space of a metric space.

Unit - II
Cauchy sequences. Completeness. Cantor's intersection theorem. Contraction principle. Construction of real numbers as the completion of the incomplete metric space of rationals. Real numbers as a complete ordered field. Dense subsets.

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Unit - III Baire Category theorem. Separable, second countable and first countable spaces. Continuous functions. Extension theorem

Unit - IV Compactness for metric spaces, continuous Function and Compact set. Sequential compactness, Heine Borel theorem

Unit - V Totally bounded spaces. Finite intersection property. Continuous functions and Connectedness. Continuous functions and connected sets

Content as in

G.R. Simons - Introduction to Topology and Modern Analysis Mc Graw Hill

M - 6.2: LINEAR ALGEBRA

NOTE : Two questions will be set from each unit with internal choice

Objectives : To develop the understanding of further Abstract Algebra

Unit - I Definition and examples of vector spaces. Subspaces. Sum and direct sum of subspaces. Linear span. Linear dependence, independence and their basic properties. Basis. Finite dimensional vector spaces. Existence theorem for bases.

Unit - II Invariance of the number of elements of a basis set. Dimension. Existence of complementary subspace of a subspace of a finite dimensional vector space. Dimension of sums of subspaces. Quotient space and its dimension.

Unit - III Linear transformations and their representation as matrices. The Algebra of linear transformations. The rank nullity theorem. Change of basis. Dual space. Bidual space and natural isomorphism. Adjoint of a linear transformation.

Unit - IV Eigenvalues and eigenvectors of a linear transformation. Diagonalization. Annihilator of a subspace. Bilinear, Quadratic and Hermitian forms. Inner Product spaces - Cauchy - Schwarz inequality. Orthogonal vectors. Orthogonal complements. Orthonormal sets and bases.

Unit - V Bessel's inequality for finite dimensional spaces. Gram-Schmidt Orthogonalization - process. Modules, submodules. Quotient Homomorphism and Isomorphism theorems.

Content as in :

I.N. Heirstein Topics in Algebra Wiley Eastern

M - 6.3 Mathematics Practicum

List of Activities:

- Activity oriented problem solving / Experiments using Mathematical software – computer programming language based on the content studied in semester VI Mathematics papers M-6.1 and M-6.2.
- Mathematics seminar.

Education Component

PC – I. Physical Sciences - 2

Contact Periods/week: 05

Maximum Marks – 60

Min. Pass Marks – 20

Internal – 15

Course objectives: The student teacher will be able to-

1. Plan learning design based on problem-situations, inquiry episodes and projects to facilitate learning of physics.
2. Realise his/her role as a facilitator in transacting physical content in the real classroom situations.
3. Explore the use and relevance of different learning resources and material in learning different in physics.
4. Develop learning materials on selected themes that facilitate learning of physical science.
5. Identify the physical themes for which community can be used as learning sites.
6. Correlate physical science related activities through science club during school attachment programme.
7. Use the science laboratory in schools, facilities and materials available in class that facilitate learning of physical sciences.
8. Get familiarised with the different types of curricular projects in physical sciences and their purposes and themes.
9. Become aware of various professional development programmes in physical sciences.
10. Reflect upon his/her own experimental knowledge in the different processes of becoming a physical science teacher.
11. Develop teaching/learning projects using ICT.

Unit 1 Pedagogic planning in learning physical sciences

Visualising learning situations in

- Grouping of learners for collaborative and cooperative learning, creating learning situations.
- Teacher and students reflections in the process of learning.
- Transaction modes in inaccessible, deprived areas of the society and for group of differently abled children (inclusive education)
- Providing multiple learning context and opportunities, encouraging student ownership of knowledge and engagement in the learning process, effective ways of questioning, engaging in learning episodes, developing the attitudes of being the rational problem solver, taking account of student's prior knowledge, encouraging student's inquiry abilities, valuing student's ideas and small group work, different ways of scaffolding and negotiating, holding brain-storm sessions.

Unit 2 Learning resources and preparation of materials

- Role of language in science
- Preparation and use of learning aids contextually
- Audio-visual materials – chart, models, films, and filmstrips, radio, TV, supplementary books, handbooks, laboratory guide, science kits etc.
- Field trips, national parks, study tours, community as a resource site for learning, physics.
- Self-learning materials- worksheets.
- ICT in learning physical science, websites on physical science, interactive websites, on line learning, and preparation of projects using ICT.
- Use of science labs- facilities, equipments, materials, and manuals, science records.
- Unit planning and lesson planning.
- Science exhibitions, contextual activities (Environmental day, Earth day, science day, etc.).
- STS connections
- Enhancing professional competency of physical science teachers through action research, participation in seminars, developing write-ups for research communication
- Learning beyond textbook

Unit 3 Assessment of learning in physical sciences

- Construction of test items to assess simple factual knowledge, higher thinking and application abilities; reliability and validity of test items, preparation of the blue print of a question paper, use of observation techniques for assessment, recording and evaluation procedures to assess the performance of students activities, projects, laboratory skills, group assessment, self and peer assessment, assessment of worksheets, student's writings; use of rubrics in assessment.
- Evaluation of text books in physical sciences at secondary stage

Unit 4 Curriculum reforms in Physical Sciences

- Salient features, merits and demerits of different science curriculum such as PSSC, BPP, CHEMStudy and CBA
- Basic criteria of validity of a science curriculum.
- Role of NCERT in preparation and uses of textbooks, handbook and lab manual at secondary stage.

Unit 5 Strengthening the use of ICT for classroom interactions.

- ICT in learning physical sciences
- Use of websites in accessing useful data for classroom processes
- Online learning
- Preparation of projects
- Preparation of student support material (CAI)

PC – 2. Biological Sciences - 2

Contact Periods/week: 05

Maximum Marks – 60

Min. Pass Marks – 2

Internal – 1

Course objectives: The student teacher will be able to-

1. Realize his/her role as a facilitator in transacting biology content in the real class room situation.
2. Develop learning materials that facilitate learning of biology
3. Identify the biological themes for which community can be used as learning site
4. To know the biology related activities through eco or science club during school attachment.

5. Develops the skill of experimental method and investigatory approaches.
6. Become aware of various professional development programmes in Biology
7. Examine the content to seek and understanding that different themes require differential treatment.
8. Develop biology projects using ICT
9. Use the computer in teaching & learning of new inventions about Biological Science.
10. Understand the functions of computer programming in teaching-learning strategies.

Unit I Pedagogical Issues

- Biology and gender issues
- Environmental concerns in biology learning
- Learning beyond textbooks
- Biology related social and ethical issues
- Application of biological knowledge in daily life.
- Role of Peace Education in Biology Education
- Inclusiveness in Biology Education

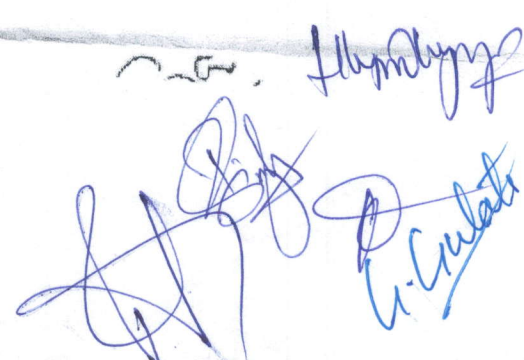
Unit II Pedagogic Planning in Biological Sciences

- Unit Planning
- Lesson Planning in biology
- Planning for exploration trips
- Learning in peer group
- Planning for teaching training through theatre and films
- Planning for teaching & drawing the diagram
- Planning to use the plant/animal specimen in teaching
- Planning to handle live plants/specimen in classroom/out of classroom teaching.

Unit III Assessment of Learning in Biology.

- Construction of test items (unit test) to assess simple factual knowledge, high thinking and application abilities. Preparation of blue print of question paper.
- Use of observation techniques, recording and evaluation procedures to assess the performance of students activities, projects, laboratory skills, drawing skills in biology.
- Group assessment, self and peer assessment, assessment of worksheets, students' journals; use of rubrics in assessment.
- Portfolio assessment.




- Preparation and use of learning aids contextually
- Audio-visual materials, charts, models, aquaria, terraria, school garden, science kits, improvised learning aids, supplementary books
- Self learning materials- worksheets
- Field trips, Natural Parks, Sanctuaries, study tours, biodiversity, economic biology, community as a resource site for learning biology
- Use of biological material in Science lab-facilities, equipments, materials, manuals, records.
- Design of laboratory, nature clubs, eco club, biology club, bird watching, organization of exhibitions, contextual activities (Environmentory, National Science Education & life week etc.

Unit V: Strengthening use of ICT in learning Biology

- Websites on Biological Sciences
- Preparation of projects in ICT
- Use of ICT for learning laboratory techniques in Biology

(Suggested books as given in fifth semester)

PC – 2. Mathematics - 2

Contact Periods/week: 05

Maximum Marks – 100

Min. Pass Marks – 20

Internal – 15

Course objectives: To enable the pupil teacher to:

- Understand and appreciate the uses and significance of mathematics in life.
- Learn successfully, various approaches of teaching mathematics and to use them judiciously.
- Know the methods of planning instruction for the classroom
- Construct test items in mathematics.
- Appreciate and organize activities to develop aesthetic sense of mathematics.
- Obtain feedback both about teaching as well as students learning
- Use the tools of ICT for effective transaction of Mathematics Teaching.

Dass
G. Gulati
R. M. Singh

Unit - 1: Planning in Mathematics Teaching

- Practice of writing specific objectives
- Unit and Lesson planning
- Inductive method of teaching mathematics
- Deductive method of teaching mathematics
- Analytic method of teaching mathematics
- Synthetic method of teaching mathematics

Unit - 2: Learning Resources and materials in Mathematics Textbook

- Self learning materials
- Teaching aids: their - meaning
 - need
 - planning
 - making and
 - appropriately using

Unit - 3: Mathematics laboratory and Mathematics club activities

- Meaning of experiments in Mathematics
- Maths lab its meaning, need & designing
- Distinction between Maths lab and Science lab.
- Mathematical games and amusements
- Recreational Mathematics
- Mathematical puzzles
- Mathematics Club
 - its organization
 - Special activities
 - Tournaments

Unit - 4: Evaluation in Mathematics

- Test items in Mathematics
 - long answer type
 - short answer type
 - very short answer type
 - objective type



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- Construction of various types of test items in Mathematics

- The precautions to be taken
- Reasons for the precautions

Unit 5: ICT in Mathematics Teaching

- MS PowerPoint: Creating, editing and enhancing PowerPoint presentation, Inserting charts (especially making mathematical documents).
- Use of 'MATHEMATICA' software.
- Use of 'MAPLE' software
- Internet Exploration: Communicating using e-mail and Internet, locating especially the ones dealing with maths. Visiting, alone sequence and creating more sequences or registering them. Internet resources, use of internet for acquiring information.

Suggested Readings:

1. Nagpal, D.P. : Computer Course
2. Twiney, D.A.: Learning through Computer
3. O'Shea T. and John S: Learning and Teaching with Computer
4. User manual for 'MATHEMATICA' software
5. User manual for 'MAPLE' software
6. What is Mathematics? An elementary approach to ideas and methods
7. Richard Courant & Herbert Robbins Oxford University Press
8. The Art of Mathematics - Jerry P. King - Plenum Press
9. Techniques of Problem Solving - Steven O. Krant, Universities Press
10. Culture, Excitement and Relevance of Mathematics -V. Krishnamurthy, Wiley Eastern Limited

Gender Issues and Peace Education

Contact Periods/week: 03

Maximum Marks - 40

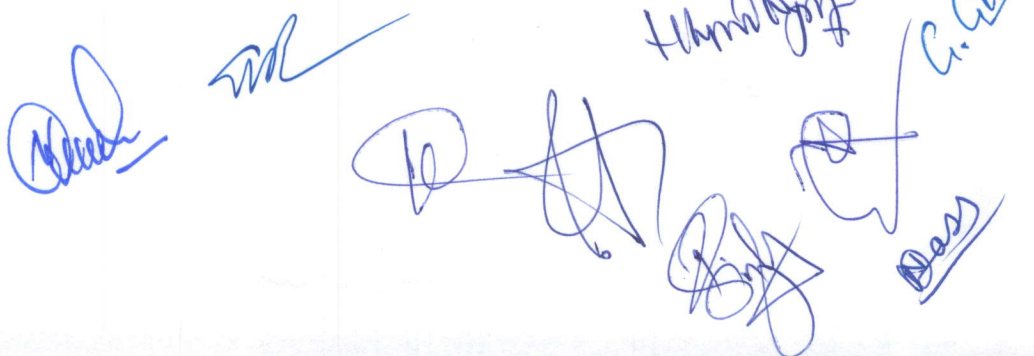
Min. Pass Marks - 13

Internal - 10

Objectives

To enable teacher trainees to acquire knowledge, attitudes, values, skills and competencies to:

- * Become aware of role of education in building peace as dynamic social reality.



- Understand and resolve conflicts within, and mediate others'.
- Empower themselves and transcend barriers of identity.
- Use pedagogical skills and strategies in and out of classroom for promoting peace at school level.
- Act as agency to promote peace in the local community influencing school.

Course Outline

Unit I: Concepts and concerns in Education for peace

- Foundation of peace and its components
- Peace Education, Education for peace: Meaning, Nature and Importance: Education for peace
- Initiatives: International, National, and local
- Highlights of various philosophies of Peace: M.K. Gandhi, Krishnamurthy, Ambedkar, Gijubhai, Budheka, Dalai Lama

UNIT II: Peace Context

- Approaches to Education for peace
- Pedagogical skills, Strategies
- Personality formation- Knowledge, Values, Skills and Attitude
- Respect for differences: Socio-economic, Gender, Caste, Religion, Culture, Languages and Regions etc.
- Activities for education for peace

UNIT III: Understanding conflicts and Empowerment of self

- Nature of conflict: causes for conflict
- Skills and strategies for conflict resolution
- Self-management: Anger, stress management, yoga, Meditation, nurturing ethical behavior, Critical self-reflection, discipline
- Effective parenting
- Teacher as peace builder- listening skills, questioning, Providing feedback
- Critical pedagogy of education for peace, promoting dialoguing, decision making
- Integration of peace in different subjects

Activities to be taken-

- Visits to organizations connected with peace and intercultural harmony, and aesthetic appreciation to experience peace as reality submission of reports on experiences.

- Assignments on topics which require deep understanding, and generating creative/alternative ideas to deal with issues and challenges to peace few suggested topics and sharing in groups.

Few suggested topics for assignments:

- Conflicts experienced at home/in family/ in society/ in school etc.
- Experiences of handling conflicts in a creative manner.
- Exploring possible strategies of resolving commonly experienced conflicts.
- Healthy discipline among school children.
- Identifying challenges of peace in school and dealing with one such challenge.
- Strategies of promoting healthy relationships on the job.
- Approaches to peace education—case studies of local and international.
- Role plays to enact situations involving conflict, corporal punishment, discrimination and domestic violence in day-to-day life.
- Films clips displaying, concerns of peace, good intercultural relationships, environmental presentation and other key ideas and discussions thereon, like- Dola Debates, Sadako etc.
- Preparation of collages from newspapers etc. to highlight issues and challenges to peace or positive response to them.
- Developing an action plan for peace in school and local community
- Visiting websites on peace education to become familiar with national and international initiatives, approaches and strategies of peace, case studies of conflict in the region.

Suggested readings:

- Gangrade K.D. (2001) Religion and peace. A Gandhian Perspective. Gandhi Samiti and Durashan samiti, New Delhi.
- Harris. I.M. 1998. Peace Education, McFarland, North Carolina. NCERT, New Delhi.
- Kaur, B. 2006. Peace Lines. Penguin Publications, New Delhi, (in Press)
- Kumar, K. (2007), Santi Shiksha Aur Gandhi. (in Hindi) Maharishi Vedic College of Education, Delhi University
- Krishnamurti.J. 1997. The Flame of Attention. Krishnamurti Foundation Trust Ltd. London.

- Ministry of Human Resource Development. 1993. Learning without Burden: A Report of the Advisory Committee, (MHRD), Department of Education, New Delhi.
- NCERT 2005, National Curriculum Framework, NCERT, New Delhi
- NCERT 2005 position paper on Educational for Peace NCERT, New Delhi
- Prasad, D (2005). Education for living Creatively and Peacefully. Spark India Hyderabad, A.P.
- Hunt, T.N. (2004). Being Peace. Nice Printing Press, Delhi
- UNESCO (2001). Learning the way the Peace- A Teacher's Guide to Peace Education. A.S. Balasooriya, UNESCO, New Delhi
- UNESCO (2002). Learning to Be. A Holistic and Integrated Approach to value Education for Human Development Bangkok.
- Weil Pierre 2002- The art of living in peace, UNESCO publication, UNIPALR

Schooling, Socialization & Identity

Contact Periods/week: 03

Maximum Marks - 40

Min. Pass Marks - 13

Internal - 10

Objectives:

- To become aware of the processes of socialization at home which contribute in shaping Identity formation of the school going child (in Indian contexts)
- To reflect critically on factors that shape Identity formation.
- To acquaint with the processes that shape one's own sense of identity.
- To become critically aware of 'identity'
- To reflect on one's aspirations and possibilities in order to develop a growing sense of agency as a 'teacher', a 'professional', as well as a 'human being'
- To recognize the clash of identity as an offshoot of narrow identity assertion
- To appreciate and work in developing national, secular and humanistic identity
- To work for the construction of universalistic and humanistic identity

Course Content:

Unit-I : Socialization and its conditioning influences

- Meaning and Nature of Socialization, and Socialization Process
- Social Institutions and Socialization: Role of Family, School, community
- Impact of socialization processes on the development of the 'self'
- Self and related concepts: self esteem, self efficacy and self actualization
- Aspects of self: physical self, social self, competent self and inner self
- Factors influencing self development: Life Skills, Professional Ethics

Unit-II: Identity formation

- Meaning of 'identity formation'
- Culture and Identity formation
- Social categories such as caste, class, gender and religion as determinants of identity formation among individuals and groups
- The influence of peer group, of media messages on identity formation in contemporary society

Unit-III: Schooling and Identity

- Schooling for identity formation
- The impact of schooling on identity formation: school culture and ethos, teaching learning practices and teacher discourse in the classroom, (practices, value framework and 'hidden curriculum' in schools)
- Schooling and national identity; schooling and secular identity; schooling and humanistic identity

Unit-IV: Identity, conflict and violence

- Emergence of multiple identities
- Assertion of identities, conflict and violence
- Learning to live together with multiple identities: role of education
- Growing Competition- Increase Conflict
- Conflict Resolution
- Concept of emotional intelligence and its role in practicing peace

Transactional Modes:

- Introductory lectures-cum-discussion, to introduce key themes of the course- socialization, identity formation, sociological notions and experiential sense of 'self'

- Group discussion and explanation, around selected readings and key questions
- Reflective, autobiographical writing, towards self-understanding, on given topics
- Journal writing, on course experiences, to be initiated... to be continued through the year, with occasional sharing with a 'mentor'
- Critical study of identity formation in schools

Suggested Readings:

- Amalendu Mitter, (2004). Identity and Religion Foundations of Anti-Islamism in India. Sage Publications, New Delhi.
- Dipankar Gupta (Ed.) (2004). Caste in question : Identity or Hierarchy . Sage Publications, New Delhi.
- Kamala Ganesh & Usha Thakkar (Ed.) (2005). Culture and Making of identity in India. Sage Publications, New Delhi.
- Sarinwati, T.S. (Ed.) (1999). Culture, Socialization and Human Development. Theory, Research and Applications in India, Sage Publications, New Delhi.
- Sen Amartya (2006). Identity and Violence. The Illusion of Destiny. Allen and Lane: Penguin Books India Pvt. Ltd. New Delhi.
- Srinivas M.N. (1986). Social Changes in Modern India, Allied Publishers, Bombay.
- Vidyannathan, T.G. (1989), 'Authority and Identity in India', in 'Another India' 1 dalus, Fall, 118(F): 147-69.

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