

**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

THIRD SEMESTER

Subject/Paper	Paper	Intern.	Total	Pds./week
B.Sc Part: Foundation Course	40	10	50	3
Comp. & ICT in Education	40	10	50	3
Language - Hindi	40	10	50	3
English				
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	375	75	450	
Curriculum Development	40	10	50	3
B.Ed Part Reading & Reflection on text		50	50	2
Community Living	-	25	25	1 Week
Arts and Aesthetics	-	25	25	2
Total	40	110	150	
Grand Total	415	185	600	

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

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

Semester Name	Paper	Mark	Paper Code	Name of Papers
III	Paper Theory-V	30	M-3 1	Advanced Calculus
	Paper Theory-VI	30	M-3 2	Differential Equation
	Internal Test	15		Related To Above Papers
	Practicum	25		Related to Above Papers

B.Sc. Component:

Foundation Course: Computers & ICT in Education – I

Contact Periods/week: 03

Maximum Marks – 40

Min. Pass Marks – 13

Internal – 10

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

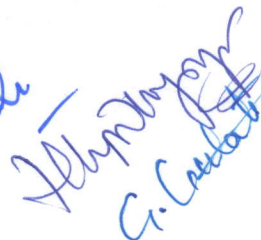
- Appreciate the historical development of various educational media.
- Explain ICT and its application in education.
- Plan multimedia based learning content using open source authoring software.
- Develop technology integrated learning materials using ICT tools.
- Explain different approaches of ICT integration in education.
- Use various ICTs for project based/problem based constructivist learning environment.
- Use ICT for designing innovative pedagogical approaches.
- Use various web 2.0 technologies for educational purpose.
- Create collaborative learning situation using various web 2.0 tools and technologies.
- Develop skills in using various e-learning tools and technologies.

UNIT-I: Introduction to Information and Communication Technology

- Use of Technology in Education: A look back
 - Role of technology in enhancing learning, basic theories of communication system theory and learning theory







- o Historical account of the development of various educational media (audio, print, video, storage, display, projection)
- o Review of the role of technology in traditional pedagogical practices- programmed learning, Keller's plan, Computer Based Instruction, Mastery Learning
- o Role of technology in emerging pedagogical practices; importance of new media literacy
- Information and Communication Technology: Meaning, nature and advantages

UNIT II – Multimedia and E-learning

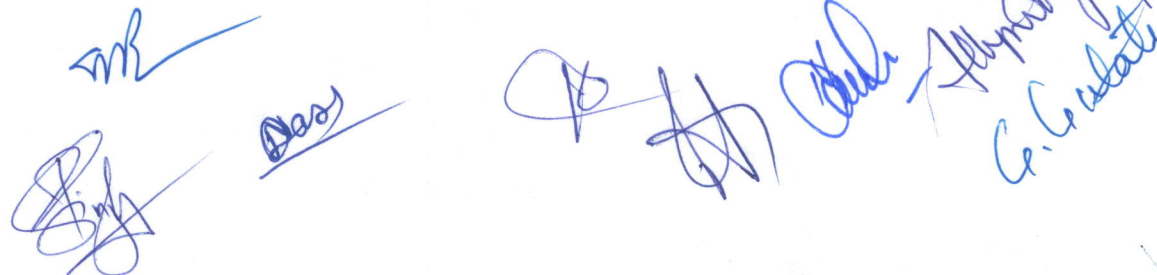
- Multimedia:
 - o Concept, meaning and procedure of creating multimedia
 - o Multimedia tools- Audio editing, video editing, screen casting, graphic editing, basics of animation, and creating interactive multimedia contents
- E-learning:
 - o Concept, types, characteristics, advantages and limitations
 - o E-learning tools and technologies- Learning Management Systems (LMS)
 - o E-content authoring tools- Open source and proprietary alternatives
 - o Re-usable learning objects (RLO) – Meaning, types and characteristics, RLO repositories

UNIT III – Web 2.0 Technologies

- Web 2.0 technology and tools: Meaning characteristics and types
- Social networking and social book-marking – Educational applications
- Blog and micro blog – Reflective Journaling and other educational applications
- Wiki – Collaborative authoring and projects
- Instant messaging and its educational applications
- Educational applications of online forums/discussion groups and chats
- Social media sharing – Video, presentations, audio (podcasts), graphics, and text
- Web 2.0 tools for creating, sharing, collaborating, and networking

UNIT-IV: ICT and Pedagogy

- Approaches to integrating ICT in teaching and learning: Technological Pedagogical Content Knowledge (TPCK)
- Subject specific ICT tools for creating and facilitating learning



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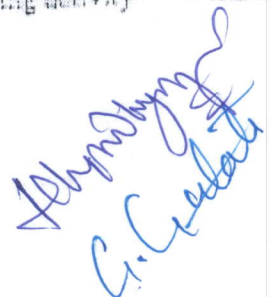
- Subject specific online resources and their use
- Designing technology integrated learning experiences
- ICT integrated Unit plan – Use of Web 2.0 for creating constructivist learning environment
- Assistive technology for children with special needs: Tools and processes; Universal Design for Learning (UDL)
- ICT for Pedagogical Innovations
 - Project/problem based learning (PBL): Role of ICT in developing technology integrated PBL unit
 - Web Quest and virtual field trips: Concept, process, and use in the classroom
 - Multiple intelligences in classroom: ICT tools and applications
 - Mobile learning and related applications
 - Open Educational Resources – Meaning and importance, various OER initiatives
 - Massive Open Online Courses (MOOC)-Concept and use
 - Flipped classrooms: Meaning and possibilities

Sessional Work

- Creating digital concept maps, flow charts, timelines for a particular content
- Creating screen cast video of a lesson
- Creating a podcast using audacity and sharing it on podcasting site
- Shooting, editing, and sharing of videos segment on any educational topic
- Creating a simple 2D animation using pencil or Tupi
- Creating and editing various graphics
- Creating account in teachertube/slideshare and sharing your video/presentation. View and comment on others contributions
- Enrolling and completing some MOOC courses of interest
- Creating resources for flipped classroom and practicing flipped learning in school
- Evaluating OER resources, Creating and sharing OER materials
- Developing technology integrated unit/lesson plans and trying out this in schools
- Hands on experience on subject specific software tools like Geogebra, PhET, Stellarium, etc.
- Taking part in an ICT integrated online project based or problem based learning activity





C. C. Chakraborty

- Developing a multimedia e-content for a topic using eXe Learning

Suggested readings

- Andrew, M. L. (2004). Understanding Open Source and Free Software Licensing, O'Reilly, Cambridge
- Bharhok, D. (2000). Fundamentals of Information Technology, Pernagon Press, New Delhi
- CEMCA (2010) Quality Assurance in Multimedia Learning Materials (QAMLM), Commonwealth Educational Media Center for Asia, 13/14 SarvaPriya Vihar, New Delhi.
- CEMCA (2014). Professional Development Programme on OER-based e-learning, Commonwealth Educational Media Center for Asia, 13/14 SarvaPriya Vihar, New Delhi.
- CEMCA (2014) Technology Tools for Teachers, Commonwealth Educational Media Center for Asia, 13/14 SarvaPriya Vihar, New Delhi.
- Curtis, J. B (2011). The World is Open: How Web Technology is Revolutionizing Education, Jossey-Bass, San Francisco
- David, M. (2009). Project Based Learning- Using Information Technology- Second Edition, Viva Books, New Delhi.
- Evans, M. The International Encyclopedia of Educational Technology.
- Owen, S. and Lynne Schrum, (2014). Web 2.0 How-to for Educators, Second Edition, STE
- Howard Pitler, Elizabeth R. Hubbell, and Matt Kuhn, (2012) Using Technology with Classroom Instruction That Works, 2nd Edition, ASCD, Denver
- Jane Hunter (2015). Technology Integration and High Possibility Classrooms: Building from IPACK
- Katherine Cumano, John Ross, Peggy Ermer, (2013). Technology Integration for Meaningful Classroom Use: A Standards-Based Approach, Wadsworth, AU
- Lee, William W., Diana L. Owens, (2001) Multimedia based Instructional design Computer Based Training, Jossey-Bass
- Liz Arney (2015). Go Blended!: A Handbook for Blending Technology in Schools
- Loveless Avril (2001). ICT-pedagogy and the curriculum, Subject to change, Routledge Falmer, London.

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- Mishra, S.(Ed.) (2009). STRIDE Hand Book 08: E-learning, IGNOU:New Delhi. Available at http://webserver.ignou.ac.in/institute/STRIDE_Hb8_webCD/STRIDE_Hb8_index.html
- NCERT (2013) Information and Communication Technology for School System: Curricula for ICTs in Education (students and Teachers). Version-1.2, CIET-NCERT, NCERT, New Delhi (www.ictcurriculum.gov.in)
- NCERT (2013) National Repository of Open Educational resources (NROER), CIET-NCERT, NCERT, New Delhi (nroer.gov.in)
- Noam Shemtov, Ian Walden.(2014)Free and Open Source Software: Policy, Law and Practice. Oxford University Press
- RoblyerM.D., Aaron H. Doering (2012).Integrating Educational Technology into Teaching (6th Edition)
- Shalin Hui-Jew. (2012). Open-Source Technologies for Maximizing the Creation, Deployment, and Use of Digital Resources and Information. Information Science Reference:USA

Foundation Course: Language – Hindi

आधार पाठ्यक्रम : हिन्दी भाषा

प्रश्नपत्र – 3

Contact Periods/week: 03

कुल अंक – 40

आन्तरिक मूल्यांकन – 10

प्रश्न एवं उत्तर निर्धारण

4. त्रैमासिक / दीर्घकालीय प्रश्न – 20 अंक (7 x 4 अ.)

समुच्चयीय प्रश्न – 07 अंक (35 x 2 अ.)

दसमुनिष्ठ प्रश्न – 06 अंक (1 x 6 अ.)

व्याख्यात्मक एवं संक्षेपानुसार प्रश्नों के आन्तरिक मूल्यांकन होते

इकाई – 1	1.	दियागी गुलामी (विशेष)	–	राहुल लालूखान
	2.	काश (कहानी)	–	गोविन्द मिश्र
	3.	विशम चिन्त (निबंध)	–	शमशिराज शर्मा
	4.	हमारा सौरमण्डल		(संकलित)
	5.	जीवन "उत्पत्ति" और संरचना		(संकलित)
इकाई – 2	1.	इन्द्रधनुष का रहस्य (विज्ञानिक लेख)	–	डॉ. मधुसूदन शर्मा
	2.	पत्नी एगुनहट बीरे नाम (कविता निर्बंध)	–	विश्वजी राय





	2	भोजन और स्वास्थ्य	-	(संकलित)
इकाई - 3	1	कला और आवाज (लिट)	-	डॉ. विजयलक्ष्मी सिंह
	2	पूछी क्यों मैं है (पर्यावरणीय विज्ञान)	-	प्रभाकर शर्मा
	3	मेरे सामग्री (माता-पिता)	-	अनुरागलाल शर्मा
	4	इष्टतम अतीत और वर्तमान	-	(संकलित)

Foundation Course: Language English

Paper III

Contact Periods/week: 03

Maximum Marks - 40

Min. Pass Marks - 15

Internal - 10

Distribution of Marks:

1. Four critical questions are to set be from unit I. Two questions are to be attempted. Each question will carry 5 marks. $2 \times 5 = 10$.
2. Out of three topics, students are required to write a report on any one topic only. $1 \times 5 = 5$.
3. Students are required to attempt 10 questions on Unit III. Each question will carry 1 marks. $1 \times 10 = 10$.
4. Students are required to attempt 5 questions on Unit IV. Each question will carry one mark. $1 \times 5 = 5$.
5. Students are required to attempt 2 questions on Unit V. Each question will carry 5 marks. $2 \times 5 = 10$.

UNIT I: Tim Morris - Tree Nissim Ezekiel - Night of the Scorpion George Orwell - What is Science? A.G.

Gardiner - On the Rule of the Road Robert Frost - Stopping by Woods on a Snowy Evening. K.

Aludhupillal - Communication & Information Technology.

UNIT II: Report Writing.

UNIT III: Production of speech sounds, classification of sounds, Transcription.

UNIT IV: Common errors in English. Words often confused.

UNIT V: Presentation Skills Drafting a CV

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Elective I – Physics

Paper III: Thermodynamics and Statistical Physics

Contact Periods/week: 05 + 4 Practical

Maximum Marks – 50

Min. Pass Marks – 20

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. Acquaint themselves with the concept of ideal and Real gas.
2. Describe historical development of laws of thermodynamics.
3. Appreciate the concept of probability.
4. Develop and understand the statistical basis of thermodynamics.
5. Explain the fundamental difference between classical and quantum statistics.
6. Appreciate the concept of indistinguishability of particles.
7. Understand Bose- Einstein and Fermi-Dirac Statistics.

Unit-1: Ideal and Real Gases

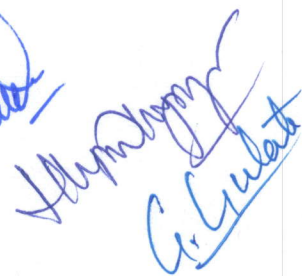
Brownian motion; estimation of the Avogadro number; specific heat of monoatomic gas; extension to di and tri atomic gases; behavior of gases at low temperatures; adiabatic expansion of an ideal gas; applications to atmospheric physics.

Transport phenomenon in gases; mean free path; collision cross sections; estimates of molecular diameter; transport of mass momentum and energy; dependence of mean free path on temperature and pressure.

Real and Van der Waals gas; equation of state; reduced equation of state; nature of Van der Waals forces; comparison with experimental P-V curve; the critical constants gas and vapour; J-T cooling, Boyle temperature and inversion temperature.

Unit -2: Thermodynamic relationships and Liquefaction of gases

Thermodynamic relationships; Thermodynamic variables; extensive and intensive, Clausius-Clapeyron heat equation; thermodynamic potentials and equilibrium of thermodynamical systems.



A. Gulati

Principle of regenerative cooling and of cascade cooling, liquification of hydrogen and helium, refrigeration cycles, cooling due to adiabatic demagnetization, production and measurement of very low temperatures.

Unit-3: The Laws of Thermodynamics

The Zeroth law; various indicator diagrams; work done by and on the system; first law of thermodynamics; internal energy as a state function and other applications; reversible and irreversible changes; Carnot cycle and its efficiency; Carnot theorem and the second law of the thermodynamics; different versions of the second law; practical cycles used in internal combustion engines; entropy; principle of increase of entropy; The thermodynamic scale of temperature; its identity with the perfect gas scale; impossibility of attaining the absolute zero, third law of thermodynamics.

Unit - 4: The Statistical Basis of Thermodynamics

Probability and thermodynamic probability; principle of equal a priori probability, probability distribution and its narrowing with increase in number of particles; the expressions for average properties; accessible and inaccessible states; distribution of particles with a given total energy into a discrete set of energy states. Equilibrium before and after two systems in thermal contact, bridge with macroscopic physics; probability and entropy; Boltzmann canonical distribution law and its applications; law of equipartition of energy.

Unit-5: Maxwellian Distribution of Speeds in an Ideal Gas

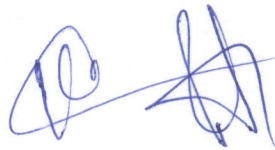
Distribution of speeds and of velocities, distinction between mean, rms and most probable speed values, Doppler broadening of spectral lines.

Transition to quantum statistics, 'h' as a natural constant and its implications, cases of particles in a one - dimensional box and one dimensional harmonic oscillator, indistinguishability of particles and its consequences; Bose- Einstein, and Fermi-Dirac statistics; Fermi level and Fermi energy, thermodynamic behaviour of an ideal Fermi gas.

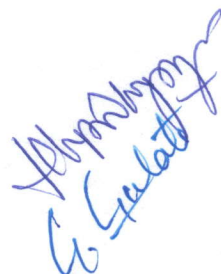
Physics Practical List

1. To study the characteristics of photovoltaic cell.
2. To simulate the decay probability curve.
3. To determine the mechanical equivalent of heat by Joule's calorimeter.
4. To verify Newton's law of cooling.
5. To determine the thermal conductivity of a non- conducting material by Lee's Disc.
6. To find the temperature of Hot metal bob using calorimeter.









7. To verify the Stefan's law of radiation by using an incandescent lamp.
8. To determine latent heat of ice.
9. To study thermal e.m.f of Fe-Cu junction.
10. To determine thermal conductivity of rubber tube.
11. To determine specific heat ratio of air by element and dorsean apparatus.
12. To determine efficiency of an electric kettle.

Suggested readings

- Land, Introduction to Statistical Mechanics, Macmillan publication.
- F. Reif, Statistical Physics, McGraw-Hill publications.
- Sears & Salinger, Thermodynamics, Kinetic theory and Statistical thermodynamics, Narosa publishing house, New Delhi.
- Thermodynamics and Statistical Mechanics, Loknathan and Gambhir

Elective I – Botany

Paper III: Diversity of Vascular Plants

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 :**
- (i) To provide an understanding of structural and functional organisation of gymnosperms and angiosperms and their evolutionary trends.
 - (ii) To enable the students to be familiar with diversity of plant habit and their basic body plan.

Unit I - Gymnosperms: General characteristics of gymnosperms and their outline classification. Evolution and diversity of gymnosperms. Origin of seed habit, geological time scale, fossilisation and fossil gymnosperms.

Unit II - Gymnosperms: Morphology of vegetative and reproductive parts, anatomy of root, stem and leaf, reproduction and life cycle of Pinus, Cycas and Ephedra.

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Unit III - Angiosperms: Origin and evolution, fossil angiosperms, brief characteristics of angiosperms, primitive angiosperms (Magnoliaceae and Winteraceae) The basic body plan of a flowering plant – modular type of growth. Diversity in plant form in annuals, biennials and perennials. Convergence of tree habit in gymnosperms, monocotyledons and dicotyledons, trees – largest and longest lived organisms.

Unit IV - The shoot system:

The shoot apical meristem and its histological organisation. Vascularisation of primary shoot monocotyledons and dicotyledons, formation of internodes, branching pattern; monopodial and sympodial growth. Canopy architecture; cambium and its functions; formation of secondary tissue xylem; a general account of wood structure in relation to conduction of water and minerals; characteristics of growth rings, sapwood and heart wood, role of woody skeleton; secondary phloem- structure-function relationships; periderm.

Unit V - Leaf:

Origin, development, arrangement and diversity in size and shape (leaf morphology) internal structure in relation to photosynthesis and water loss; adaptations to water stress; senescence and abscission.

The root system:

The root apical meristem; differentiation of primary and secondary tissues and their roles; structural modification for storage, respiration and interaction with microbes.

Practical

Objectives:

- i) To develop the skills of section cutting and double staining of vascular plants.
- ii) To provide field experiences to students for studying plant habits and basic body plan.

1. Cyvus :

- (i) Habit, armour of leaf bases on the stem, very young leaf (circinate vernation) and old foliage leaves, bulbils, male cone, microsporophyll, Megasporophyll, mature seed.
- (ii) Study through slides – normal root (T.S.), stem (T.S.), Ovule (L.S.) microsporophyll.
- (iii) Study through hand sections or dissections – coralloid root (T.S.), Rachis (T.S.), leaflet (T.S.).



2. Plants :

- (i) Habit, long and dwarf shoot showing cataphylls and scale leaves, T.S. of wood showing growth rings, male cone, 1st year, 2nd year and 3rd year female cones, winged seeds.
- (ii) Study through permanent slides - root (T.S.), female cone (L.S.), ovule (L.S.), embryo (W.M.) showing polycytledonous condition.
- (iii) Study through hand sections or dissections - young stem (T.S.), old stem (wood) (T.L.S. and R.L.S.), needle (T.S.), male cone (L.S.), male cone (T.S.), pollen grains (W.M.).

3. Ephedra :

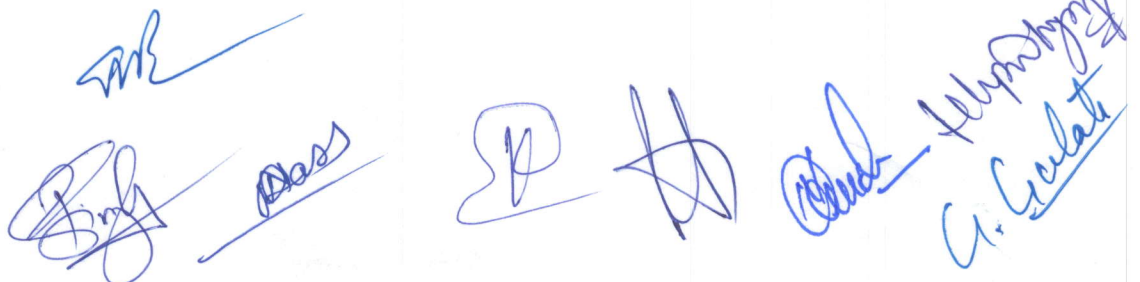
- (i) Habit and structure of whole male and female cones.
 - (ii) Permanent slides - female cone (L.S.).
 - (iii) Hand sections/dissections - node (L.S.), internode (T.S.) macerated stem to see vessel structure; epidermal peel mount of vegetative parts to study stomata, male cone (T.S. and L.S.) pollen grains.
4. Study of any commonly occurring dicotyledonous plant (for example *Solanum nigrum* or *Kalanchoe*) to understand the body plan and modular type of growth.
5. Life forms exhibited by flowering plants (by a visit to a forest or a garden) Study of tree like habit in cycads, bamboos, banana traveller's tree (*Ravenala madagascariensis*) or *Yucca* and comparison with true trees as exemplified by conifers and dicotyledons.

Scheme of Practical Examination:

1. Section cutting and double staining (Gymnosperms).	5
2. Section cutting and double staining (Angiosperms).	5
3. Preparation of Report on field visit for studying plant habits.	5
4. Comment upon the spots (1-5).	5
5. Practical record.	5
6. Internal evaluation	5

Suggested Readings

- Bhatnagar, S.P. and Mohra, A. 1996 Gymnosperms, New Age International Ltd: New Delhi
- Gifford, E.M. and Foster, A.S., 1988, Morphology and evolution of Vascular plants, W.H. Freeman & Company, New York
- Sundera Rajan, S. 2003. Plant Morphology. Annual Publication Pvt. Ltd. New Delhi



- Vashishta, B.R. 2003. Pteridophyta. S. Chand & Co. New Delhi
- Vashishta, B.R. 2005. Gymnosperms. S. Chand & Co. New Delhi
- Sorne, K.R. The Morphology of Pteridophyta. Hutchinson, London
- Radzani & Samsi, Gymnosperms. FRI Publication
- Singh V., Pande, P.C. and Jain D.K. 2004 Diversity and Systematics of Seed Plants, Rastogi Publication
- Singh V., Pande, P.C. and Jain D.K. 2004. Structure, Development and Reproduction in Angiosperms, Rastogi Publications
- Naik V.N. 1984 Taxonomy of Angiosperms Tata McGraw-Hill Publishing Company Limited, New Delhi.

Elective II – Chemistry

Paper III

Contact Periods/week: 05 + 4 Practical

Maximum Marks – 60

Min. Pass Mark – 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:

After completing 3rd semester the students should be able to:

- make a comparative study of group 13-17 elements and rationalize the importance of comparative study.
- explain the structure and properties of the compounds of p-block elements including noble gas family particularly keeping focus on the recent discoveries.
- acquire the knowledge of characteristic properties of transition elements and explain the properties in terms of oxidation states exhibited by the elements.
- compare the chemistry of first, second and third transition series elements and explain the stereo chemistry associated with complexes.
- appreciate to learn the theories involved in coordination chemistry and judge their comparative contribution in the study of complexes.

- (vi) explain the principles involved in the extraction of elements and correlate this with the thermodynamical principles.
- (vii) acquire the knowledge of characteristic properties shown by lanthanides and actinides and utilize the knowledge in the isolation of lanthanides.
- (viii) appreciate the similarities between later actinides and later lanthanides.
- (ix) construct the knowledge of different theories of acids and bases and judge the wider applicability of Lewis concept.
- (x) appreciate to gain knowledge of some non-aqueous solvents like ammonia and liquid sulphur dioxide and compare them with aqueous system.

Instructional Strategy:

To handle the study of descriptive chemistry, the teacher should highlight the role of structures as they affect the trends in properties. To make the subject matter presentation interesting and lucid in approach, the chemistry associated with the elements be discussed in terms of the trends in oxidation states exhibited by the respective elements. The subject treatment of isolation of elements be highlighted in the framework of thermodynamic principles. The different theories proposed to discuss the coordination compounds be dealt with in terms of their need and limitations. To discuss the acid base system and the chemistry of non aqueous solvents the possibility of the use of Ausubel's Advanced Organizer model should be explored by the teacher.

Unit-I s-Block Elements

Comparative study, diagonal relationships, salient features of hydrides, solvation and complexation tendencies including their function in biosystems, an introduction to alkyls and aryls

p-Block Elements Part-I

Comparative study (including diagonal relationship) of group 13-17 elements, compounds like hydrides, oxides, oxyacids and halides of group 13-24, hydrides of boron-diborane and higher boranes, borazine, borohydrides.

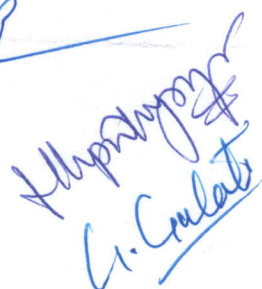
p-Block Elements Part-II & Chemistry of Noble Gases

Fullerenes, carbides, fluorocarbons, silicates (Structural principle), tetrasulphur tetranitride, basic properties of halogens, interhalogens. Chemical properties of the noble gases, chemistry of xenon, structure and bonding in xenon compounds.









Unit-II Chemistry of Elements of First Transition Series :

Characteristic properties of d-block elements.

properties of the elements of the first transition series, their binary compounds such as Carbides, Oxides and Sulphides. Complexes illustrating relative stability of their oxidation states, coordination number and geometry. Chemistry of Elements of Second and Third Transition Series .

General characteristics, comparative treatment with their 3d-analogues in respect of ionic radii, oxidation states, magnetic behaviour, spectral properties and stereochemistry

Unit-III A. Coordination Compounds

Werner's coordination theory and its experimental verification, effective atomic number concept, chelates, nomenclature of coordination compounds, isomerism in coordination compounds, valence bond theory of transition metal complexes.

B. Oxidation and Reduction

Use of redox potential data-analysis of redox cycle, redox stability in water-Frost-Latimer and Pourbaix diagrams. Principles involved in the extraction of the elements.

Unit-IV A. Chemistry of Lanthanide Elements :-

Electronic structure, oxidation states and ionic radii and lanthanide contraction, complex formation, occurrence and isolation, lanthanide compounds.

B. Chemistry of Actinides :

General features and chemistry of actinides, chemistry of separation of Np, Pu and Am from U, similarities between the later actinides and the later lanthanides.

Unit-V A. Acids and Bases :

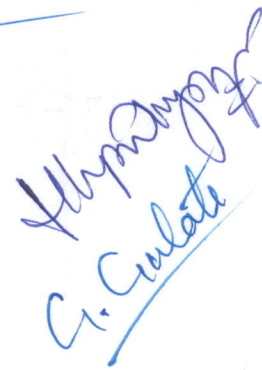
Arrhenius, Bronsted- Lowry, the Lux-Flood, solvent system and Lewis concepts of acids and bases.

B. Non-aqueous Solvents :

Physical properties of a solvent, types of solvents and their general characteristics, reactions in non-aqueous solvents with reference to liquid NH_3 and liquid SO_2 .

Suggested Readings:

1. Cotton, F.A. , G. Wilkerson, 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



A. G. Gualate

4. Malik, Madan and Tuli; Modern Inorganic chemistry. S. Chand and Company Ltd.
5. Douglas, Bodie, B.; 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:

Practical:

List

1. Semi micro analysis of inorganic mixture containing five ions including typical combinations, insolubles and interfering ions. anions: CO_3^{2-} , CH_3COO^- , NO_2^- , SO_3^{2-} , S^{2-} , F^- , Cl^- , Br^- , I^- , NO_3^- , SO_4^{2-} , PO_4^{3-} , $\text{C}_2\text{O}_4^{2-}$, BO_3^{3-} cations: NH_4^+ , Ag^+ , Na^+ , K^+ , Pb^{2+} , Hg_2^{2+} , Hg_2^{+} , Cu^{2+} , Cd^{2+} , Bi^{3+} , As^{3+} , Sb^{3+} , Sn^{4+} , Fe^{3+} , Cr^{3+} , Al^{3+} , CO^{2+} , Ni^{2+} , Zn^{2+} , Mn^{2+} , Ba^{2+} , Sr^{2+} , Ca^{2+} , Mg^{2+} .
2. Estimation of hardness water by EDTA method.
3. Estimation of chloride using volhard method.
4. Estimation of glucose aniline or phenol.

Scheme

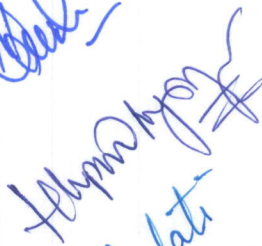
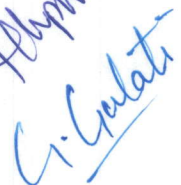
Experiments: Time allotted - 5 hrs

(1)	Mixture analysis	-	10
(2)	Volumetric Estimation	-	5
	internal assessment	-	5
	Viva	-	5







Elective III – Zoology

Paper III

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 study structure and function of cell, various aspects of genetics, inheritance and evolution.

Unit-1

1. The cell – history of cell biology, cell theory, prokaryotes and eukaryotic cell.
2. Nuclear organization of cell.
3. Extra nuclear organization of cell.
4. Plasma membrane- theories structure and function.
5. Cell reproduction – mitosis, meiosis and meiosis.

Unit-2

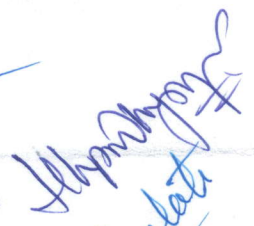
1. Chromosome – structure, types (lamp brush, salivary and beta chromosomes) .
structural and numerical changes.
2. Mendelian principles of heredity
3. Post Mendelian genetics
4. Sex chromosome system: chromosome theory of sex determination, sex linked inheritance (haemophilia & colour blindness)

Unit-3

1. Linkage & crossing over (theories of linkages, significance of linkage and mechanism of crossing over)
2. Linkage maps
3. Human chromosomes and maps, eugenics (common genetic diseases in man- sickle cell anaemia, alkaptonuria and albinism)
4. Euphenics and euthenics.

Unit-4

1. Multiple factors (blood groups) A ;


2. Twins- physical and mental traits
3. Cytoplasmic inheritance- maternal effects in Limnea shell coiling
4. Carbon di-oxide sensitivity in Drosophila and kappa particles in Paramecium

Unit-5

1. Brief account of origin of life on earth
2. Origin of eukaryotic and prokaryotic cells
3. Concept of evolution (micro and macro evolution)
4. Lamarckism, neo-Lamarckism, Darwinism and neo-Darwinism
5. Evidences and mechanism of evolution, species and speciation

PRACTICAL

Objective- to develop skills of identification of cell and its organelles and to gain the ability to recognize aspects of genetic and cytogenetic techniques for understanding the processes of inheritance

1. Study of prokaryotic and eukaryotic cell through charts and models
2. Demonstration of mitochondria in cheek epithelial cells by Janus green staining
3. Demonstration of mitosis in onion root tip cells
4. Study of meiosis in grass hopper testes
5. Demonstration of Polytene chromosomes in Chironomus/Drosophila larvae
6. Demonstration of Barr bodies in hair root bulb cells and cheek epithelial cells
7. Pedigree analysis through charts and handouts
8. Karyotype analysis through charts and handouts
9. Problem solving of linkage analysis and human blood types

SCHEME OF PRACTICAL EXAMINATION

1. Spotting	-	04
2. Temporary Preparation (Exercise-I)	-	04
3. Temporary Preparation (Exercise-II)	-	06
4. Problem Solving/Karyotype/Pedigree		04
5. Practical Records	-	03
6. Viva-voce	-	04

Total - 25 Marks

Internal assessment - 05 Marks

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Referred books :-

1. Textbook of cell biology- de Robertis
2. Textbook of cell biology- Karp
3. Textbook of cell biology- Alberts et. Al.
4. Textbook of cell biology- Cooper
5. Cell and Molecular Biology- P.K. Gupta
6. Principles of Genetics- Gardner et. Al.
7. Principles of Genetics- Klug and Cummings
8. Principles of Genetics- P.K. Gupta
9. Genetics and Principles of heredity- Winchester
10. Evolution- Dodson
11. Evolution- Douglas J Futuyma
12. Evolution- V. B. Rastogi
13. Ecology and Evolution- Dalela
14. Meaning of Evolution- G. G. Simpson

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 - 3.1: ADVANCED CALCULUS

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

Objective: To develop understanding of advanced calculus

Unit-I Definition of a sequence. Theorems on limits of sequences. Bounded and monotonic sequences. Cauchy's convergence criterion. Series of non-negative terms. Comparison tests. Cauchy's integral test. Ratio tests. Raabe's logarithmic, de Morgan and Bertrand's tests. Alternating series. Leibnitz's theorem. Absolute and conditional convergence.

Unit-II Continuity, sequential continuity. Properties of continuous functions Uniform continuity. Chain rule of differentiability. Mean value theorems and their geometrical interpretations.

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Dirichlet's intermediate value theorem for derivatives. Taylor's theorem with various forms of remainders.

Unit-III Limit and continuity of functions of two variables. Partial differentiation. Change of variables. Euler's theorem on homogeneous functions. Taylor's theorem for functions of two variables.

Jacobians. Indeterminate forms.

Unit -IV Maxima, minima and saddle points of functions of two variables. Lagrange's multiplier method.

Unit - V Beta and Gamma functions. Dirichlet's integrals. Double and triple integrals. Change of order of integration in double integrals.

Content as in

S.C. Mallick - Mathematical Analysis :Wiley Eastern Limited

M - 3.2 DIFFERENTIAL EQUATION

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

Objectives : To develop understanding of advanced differential equations with Application.

Unit - I Series solutions of differential equations - power series method. Bessel, Legendre and Hypergeometric equations. Bessel, Legendre and Hypergeometric functions and their properties - convergence, recurrence and generating relations.

Unit - II Orthogonality of functions. Sturm Liouville problem. Orthogonality to eigen functions. Reality of eigenvalues. Orthogonality of Bessel functions and Legendre polynomials.

Unit - III Laplace Transformation - Linearity of the Laplace Transformation. Existence theorem for Laplace transforms. Laplace transforms of derivatives and integrals. Shifting theorems. Differentiation and integration of transforms. Convolution theorem. Solution of integral equations and systems of differential equations using the Laplace transformation.

Unit - IV Partial differential equations of the first order. Lagrange's solution. Some special type of equations which can be solved easily by methods other than the general method. Charpit's general method of solution.

Unit - V Partial differential equations of second and higher orders. Classification of linear partial differential equations of second order. Homogenous and non-homogenous equations with constant coefficients. Partial differential equations reducible to equations with constant coefficients. Monge's methods.

Content as in:

1. D.A.Murray: Introductory Course in Differential Equation Orient Long Man
2. Murray and R.spigel: Theory and Problems Of Laplace transformations. Schaum series.
3. Sneddon: Elements of Partial Differential Equation, McGraw-Hill

M - 3.3 Mathematics Practicum

List of Activities:

- Activity oriented problem solving / Experiments using Mathematical software or computer programming language based on the content studied in semester III Mathematics papers M-3.1 and M-3.2.
- Mathematics seminar.

Education Component:

Curriculum Development

Contact Periods/week: 03

Maximum Marks – 40

Min. Pass Marks – 13

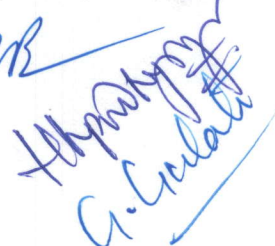
Internal – 10

Objectives

- To understand the concept and principles of curriculum.
- To make the distinction between curriculum and syllabus
- To understand the bases and determinants of curriculum studies.
- To gain insight into the development of curriculum.
- To appreciate the need for continuous and comprehensive curriculum reconstruction.
- To enable students to understand implementation and evaluation of curriculum.

UNIT-1: Concept of curriculum

- Meaning and nature of curriculum; Need for curriculum in schools.
- Differentiating curriculum framework, curriculum, syllabus and unit; their significance in school education.



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based curriculum.

- Curriculum visualized at different levels: National level; State level, school level, class level and related issues.

UNIT-III: Determinants and considerations of curriculum

- Determinants of Curriculum; Socio-political, Cultural, Technical and Economical
- Curriculum considerations:
 - a. Educational objectives,
 - b. Learners characteristic: Nature of learner, their Socio cultural Context and learning process
 - c. Relevance of stage of schooling
 - d. Teachers experiences and concerns,
 - e. Environmental concerns,
 - f. Gender, Inclusiveness, social sensitivity.

UNIT-III: Curriculum development

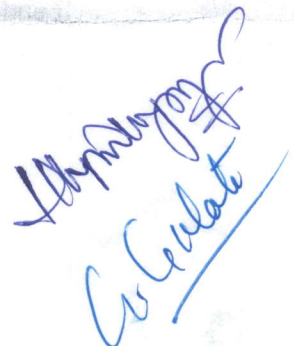
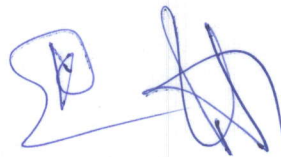
- Concept, Need and Scope of curriculum development.
- Strategies of curriculum development.
- Guiding principles of curriculum development.
- Approaches of curriculum development: Administrative approach, Grass root approach, Demonstration approach, System approach.

UNIT-IV: Implementation and Evaluation of Curriculum

- Role of school philosophy and Administration in creating context for curriculum development, Available infrastructure, Curriculum sites, resources (library, laboratory, school playground, neighbourhood etc.
- Teacher's Role in Curriculum construction, Curriculum Transaction, researching in curriculum.
- Role of a teacher as a critical pedagogue.
- Role of external agencies in providing curriculum and pedagogical supports to teachers within schools-local, regional, national.
- Models of curriculum evaluation: Tyler model, Hilda Taba.

Sessional Work

- Study of NCF 2005 as well as the earlier school curriculum frameworks



- Discussion on purpose of curriculum framework
- Critical Evaluation of the extent to which the curriculum framework is reflected in the syllabus
- Interaction with school teachers and principal, how they operationalise the prescribed curriculum into an action plan
- How curriculum is evaluated and revised

Mode of Transaction

Lecture, Discussion, debate, Project, Activities etc.

Suggested readings:

- Aggarwal, Deepak (2007): Curriculum development: Concept, Methods and Techniques. New Delhi. Book Enclave.
- Arora, G.L. (1984): Reflections on Curriculum. NCERT.
- Bob Moon and Patricia Murphy (Ed) (1999). Curriculum in Context. Paul Chapman Publishing, London.
- Butchvarov, P. (1970). The Concept of Knowledge, Evanston, Illinois: North Western University Press
- Chomsky, N (1986). Knowledge of Language, Praeger, New York
- Datta, D.M. (1972). Six ways of Knowing. Calcutta University Press, Calcutta.
- G.W. Ford and Lawrence Pungo, (1964). The structure of Knowledge and the curriculum. Rand McNally & Company, Chicago.
- Joseph Schwab, (1969). The Practical: A language for curriculum. School Review, November.
- Kelley, A.B. (1996). The Curricular Theory and Practice. Harper and Row, US.
- Kumar Krishna (1997). What is Worth Teaching. Orient Longman, New Delhi.
- Margaret, K.T. The open Classroom, Orient Longman: New Delhi, 1999.
- NCERT (1984). Curriculum and Evaluation, NCERT, New Delhi.
- NCERT (2006). Systematic reforms for Curriculum change. New Delhi.
- Dewey, John (1966). The Child and the Curriculum. The University of Chicago Press
- NCTE (2009) National Curriculum Framework for Teacher Education.
- NCERT (2000). National Curriculum Framework for School Education, NCERT, New Delhi.

- NCERT (2005). National Curriculum Framework, NCERT, Sri Aurobindo Marg, New Delhi.
- NCERT (2014). Basics in Education, NCERT, Sri Aurobindo Marg, New Delhi.
- Nirantar (1997). Developing a Curriculum for Rural Women, Nirantar, New Delhi.
- Padma M. Samyapant (2003). Constructing School Knowledge, An Ethnography of learning in an Indian Village, Sage Publication Inc., New Delhi.
- Prema Clarke (2001). Teaching & Learning: The Culture of pedagogy, Sage Publication, New Delhi.
- Steven H. Cain (1970). The Philosophical Foundation of Education, Harper & Row Publishers, New York.
- Taba, Hilda (1962). Curriculum Development. Theory and Practice, Har Court, Bruce and Wald, New York.
- Wiles, J.W. & Joseph Bondi (2006). Curriculum Development: A Guide to Practice, Pearson Publication.
- Wheeler D.K. (1967) Curriculum Process, University of London Press.

Reading and Reflecting on Text

Contact Periods/week: 02

Maximum Marks – 50

Min. Pass Marks – 17

Internal – 50

Course objectives

- To engage students closely with text and develop taste for readings.
- To enable students to read, interpret and reflect on different types of text.
- To enable students to appreciate knowledge present in either English medium textbooks/journals/articles or other available material present in the regional language.
- To facilitate students to self-learning, self-reflection and ability to express their thought in writings or debates and discussion.

Unit: I- Understanding the Text

- Identifying the text as a tool: meaning of text and its form, expression and procedure
- Nature and role of available literature; textbook, journals, articles, abstracts, extended abstracts, encyclopedia

- Surveying a text : making notes, understanding how facts, ideas are connected and giving reflections, making inferences
- Role of conceptual and analytical framework in understanding the text

Unit 11- Engaging with narrative and descriptive accounts

- Selection of children literature, adult literature and inclusive literature: nature of text and its form, selection of movies, stories, chapters from fiction, autobiographical narratives, historical narratives etc.
- Reading for comprehending and visualizing the accounts (individual and group reading)
- Discussion and debate on characters, context and scenarios and sharing interpretations
- Writing summary, scene, abstract, dialogue, report with key idea in the text

Unit III- Engaging with subject related reference books

- Selection of a problem or issue and articulating guided questions
- Selection of text from various types of resources
- Preparing notes, writing summary and connect it with issues or problems initiated
- Group and individual assignment and presentation on any educational idea/text

Suggested Readings

1. Ashton-Warner, S. (1963). Teacher. New York: Simon and Schuster. Hindi translation- Poorva Yangnik Kushwaha. Granth Shilp Publisher.
2. Asimov, Isaac. (1982). How did we find out about Beginning of life? Hindi translation- Arvind Gupta.
3. Dadheku, Gijubhai. (1931). Divaswapna
4. Darwin, Francis. (2009). Charles Darwin ki Autmakatha, Sasin Shitya Mandal Publication. New Delhi.
5. Gorky, Maxim. (2005). Ek chote ladke aur ek choti ladki ki kahani jo barfili thand mein bithkar kar mar chuki thi. Anurag Trust, Niranjanagar, Lucknow.
6. Graff, G. & Birkenstein, C. (2014). They say, I say: The Moves That Matter in Academic Writing. Third Edition, W.W. Norton & Company.
7. Holt, J. C. (1964). How children fail. New York: Pitman. Hindi- Bachhe Asafai Kaise Hote Hain. Eklavya Publication.
8. Holt, J. C. (1974). Escape from childhood. New York: E.P. Dutton. Hindi- Bachpan se Palayan. Eklavya Publication.

Palayan, Eklavya Publication.

9. Kumar, Krishna. (2014). What is worth Teaching. Orient Blackswan Private Limited, New Delhi. 1-22.
10. Kuroyangi, Tetsuko. (1981). Totto-Chan: The Little Girl at the Window. English translation : Britton, D. Hindi translation: Poorva Yagnik Kushwaha
11. Ramchandran, Vimala. (2005). Why School Teachers are demotivated and disheartened, Economic and Political Weekly. 2141-2144
12. India Untouched: Stories of a People Apart, Feature Documentary by Smita K.

Community Living

Contact Periods/week: 2 Practical

Maximum Marks - 25

Min. Pass Marks - 08

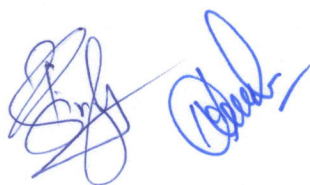
Internal - 25

Objectives:

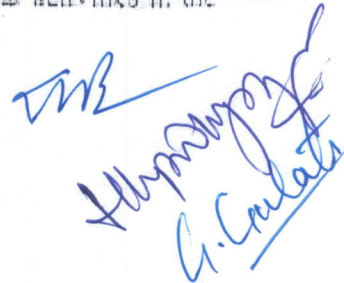
1. To provide real-life community experience to the student-teachers.
2. To provide knowledge and skills to conduct various surveys, case studies and interviews.
3. To create awareness on various socio-cultural and environmental issues and problems.
4. To inculcate the value of work in student-teachers.
5. To develop leadership skills among student-teachers.
6. To develop an understanding of sharing of responsibility.
7. To encourage participation in various social activities.
8. To acquaint student-teachers with the real working culture of the village schools.
9. To provide exposure to student-teachers of remote village living

Activities

'Working with Community' is a programme to provide the real-life community experience to the student-teachers. It will be organized in camp-mode. The student-teachers have to stay in a village for five days and to work with the community. They will undertake the activities like educational survey, case study, 'shramdan', interviews, visiting schools and other govt. and non-governmental organisations of the village. They will launch door-to-door campaign on various themes, like, girl-child education, literacy, 'Swachh Bharat Abhiyan', female foeticide, health and hygiene, cleanliness, save water, organic farming, environmental awareness, etc. Awareness campaign will be launched by organizing cultural activities in the







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evening. After completion of the camp, the student-teachers have to submit a report of the five days.

Modes of Assessment

The student-teachers will be assessed on the basis of their active participation in various activities, individual and group presentations and report submission.

Art & Aesthetic

Contact Periods/week: 02

Maximum Marks : 15

Min. Pass Marks : 08

Internal : 25

COURSE - CONTENT

Unit-1: कला- कला रचनाओं की समझ

- कला की विभिन्न विभिन्न प्रजातों की बारे में जानकारी। समझना, महसूस करना, आलोचना करना, प्रदर्शित करना।
- Historical perspectives/importance: integration of life, culture of India.
- कला में Art & craft की skills, observation, analysis, synthesis, problem solving and evaluation.
- विभिन्न कलाकारों/कला

Unit-2: नृत्य एवं संगीत कलाएं

- भारतीय नृत्य और संगीत कलाएं।
- नृत्य का अभ्यास, प्रदर्शन, सामाजिक विकास की महत्त्व, सांस्कृतिक विरासत। (संगीत, नृत्य, मोड़ी, प्रयोग)।

Unit-3: कलाएं एवं टेक्नोलॉजी का सम्बन्ध-

- कला कलाओं को Website पर अपलोड / डाउनलोड करना।
- Digitalization of Arts
- कलाओं की प्रदर्शनी Activity को ICT करना।
- कलाओं का डिजिटलाइजेशन (ICT के माध्यम से)

(Introduction, objectives, activities, assignments, projects, references and web-sites as per the Semester in the context of the above course content)