COMPULSORY ENGLISH
SEMESTER-I
PAPER-I
PROSE, POETRY AND ENGLISH USAGE

Contact Hours: 4 per week
Exam Duration:3 Hours
Maximum Marks: 100
Term End Exam : 75 Marks
Sessional : 25 Marks

Unit I. Short stories
- Hungry stones – Rabindranath Tagore
- The Tunnel – Ruskin Bond
- Idgah – Prem Chand

Unit II. Poetry
- When I have fears that I may cease to be - Keats
- Futility   - Wilfred Owen
- Lake Isle of Innisfree – W. B. Yeats
- Welcome – J. P. Das
- The Neem Flowers – Kunwar Narain

Unit III. Appreciation of one unseen prose passage,   Appreciation of one unseen poem

Unit IV. Letter Writing: Official / Business / Social

Unit V. Paragraph Writing: Describing a process, an object, an event

HEALTH AND WELL BEING

Contact Hours: 2 per week

Internal Assessment (Five point Grade)

Objectives:

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

- Develop skills to conduct medical check-up,
- Develop competency to participate and conduct competitions in physical activities,
- Verify their physical efficiency through tests of Physical Efficiency Tests,
- Develop physical, mental and emotional well being through yoga and games
- Develop social values

Transaction Mode: Oral, Demonstration, Imitation, Command, Dramatisation, part-by-part method and whole methods

Practical Area:

CONTENT

Unit 1 : Medical check-up

- Conducting of medical check-up and recording in the health register – Folow up with doctor wherever required
- First aid: Demonstration of first aid for fracture, cuts, sprain etc.

Unit 2: Competitions:

- Drawing of fixtures for conducting tournaments – Knock-out, League. Intramural competitions – Marking of courts on the field
- Lay out of Track and Field areas and participating in conducting Annual Athletic Meet

Unit 3 : Major Activities : Skills and fundamental rules

Track and field events (Any two events other than the 1st year events opted) like 100M, 200M, 400M, 800M, 1500M, Long Jump, High Jump, Triple Jump, Shot put, Discuss, Javeline, Relay etc.

Major Games : (Any one game other than the 1st year opted game) like

Throw ball, Volley ball, Tennikoit, Chess, Table Tennis, Cricket, Football, Basket ball etc.

- Yoga : Any two yogasanas other than the two opted during 1st year like, Padmasana, Vajrasana, Paschimottanasana, Halasana, Bhujangasana, Dhanurasana etc.
- Physical Efficiency Test: Single star test or any other Physical Efficiency Test shall be conducted based on the availability of resources.

Grading:

A = Excellent

B= Very Good

C = Good

D = Average

E=Poor

Modes of Assessment:

Faculty should encourage student-teachers to participate in the above activities and keep track of their participation as part of their overall profile. A descriptive assessment should be made on the basis of overall level of participation for each year. The engagement of student teachers in the above set of experiences should be quantitatively and qualitatively evaluated, based on observations and submissions of projects and assignments and an overall grade should be assigned.

References

Butcher, C.A (1968).Foundations of Physical Education,(5th Edition),St.Loius ,The C.V.Mosby & Co Ltd

First Aid Manual: The St.John Ambulance Association and Brigade, The British Red cross Society

NCERT (2005).National Curriculum Framework-2005, New Delhi

Thirunarayanan,C &Sharma,HH(1959).Methods in Physical Education,Karaikudi ,South Indian Press

Thirunarayanan, C &Sharma, HH.Track and Field, Karaikudi, South Indian Press

WHO (1991).Comprehensive School Health Curriculum, Regional Office foe South East Asia, New Delhi

Williams,J.F(1964).The Principles of Physical education ,Philadelphia and London,W.B.Saunders Co

ISSUES OF CONSERVATION AND ENVIRONMENTAL REGENERATION

Contact Hours: 2 Per week

Marks: 50 (Internal-15,External-35)

Objectives of the Course

NCERT has developed a new curriculum framework (NCF) in 2005 based on position papers of 21 National Focus Groups. The focus groups worked on three major areas – the curricular areas, systemic reforms and national concerns. The NCF suggests that the national concerns and related issues are to be integrated at appropriate places while transacting the content of the curricular areas. Conservation of Environment and protection of wild life is one of the core areas of education as specified in the National Policy on Education (NPE-986). The NCF-2005 has been accepted by Central Advisory Board on Education (CABE) of Govt. of India. Therefore the issues of conservation and environmental regeneration have been infused at appropriate places in all the textbooks developed by NCERT for classes I to XII.

Since a course on 'Environmental Education' (syllabus developed by UGC and approved by the Hon'ble Supreme Court of India) is a compulsory paper at the undergraduate level. It is therefore expected that all students getting admission into the two year B.Ed course have requisite knowledge on environmental concerns and issues.

The syllabus for 'Issues of Conservation and Environmental Regeneration' aims to orient student-teachers analyse and understand environment concerns through the process of inquiry, critical analysis, intellectual discourse and essential projects.

Unit I Environmental Conservation and Related Issues

- Importance need and scope of Environmental Conservation and Regeneration.
- Structure and functions of different ecosystems.
- India as a mega biodiversity nation.
- Role of individual in conservation of natural resources: water, energy and food.
- Role of individual is prevention of pollution: air and water.
- Equitable uses of resources for sustainable livelihoods.
- Environmental legislation: awareness and issues involved in enforcement.
- Role of information technology and media in environment and human health.

Suggested Practicum

The students on completion of each topic of the of Unit-I will submit a small assignment in the form of an activity. This may include observation of important relevant days, preparation of bulletin board material, wall games, crossword puzzles, worksheet etc. The class can also form an environment club. The activity has to be on some local specific issue pertaining to the place of residence of the student.

Unit II Conservation of Environment and Sustainable Development

- Community participation in natural resource management- water, forests etc.
- Deforestation in the context of tribal life.
- Sustainable land use management
- Traditional knowledge and biodiversity conservation.
- Developmental projects including Government initiatives and their impact on biodiversity conservation.
- Role of media and ecotourism in creating environmental awareness.
- Shifting cultivation and its impact on environment.
- Change in forest cover over time.
- Consumerism and waste generation and its management
- Genetically Modified crops and food security.
- Water consumption pattern in rural and urban settlement.
- Ethno-botany and its role in the present day world.
- Environmental degradation and its impact on the health of people.
- Economic growth and sustainable consumption
- Agricultural waste: their impact and management.
- Rain water harvesting and water resource management.
- Biomedical waste management.
- Changing patterns of energy and water consumption.

Unit III Environmental Management

- Environmental conservation in the globalised world.
- Alternative sources of energy
- Impact of natural disaster/man-made disaster on environment.
- Biological control for sustainable agriculture.
- Heat production and green house gas emission.
- Impact of industry/mining/transport on environment.
- Sustainable use of forest produces.
- Female foeticide/ infanticide and skewed sex ratio.
- Development of slum area and their inhabitants.
- HIV/AIDS, Malaria-status, measures undertaken for their control/ eradication.

Suggested Practicum

From the wide range of topics suggested in Units II, and III, the student will be assigned one topic. The student will develop a seminar document, which will be submitted after the seminar. The seminar document will be evaluated by teacher educators.

Modes of Learning Engagement

- Case studies and success stories
- Problem solving and enquiry methods
- Small assignments which may include observation of important relevant days, preparation of bulletin board material, games, crossword puzzles, worksheet etc.
- Setting up of environmental club.
- Conducting a seminar and developing a seminar document
- Project work and writing of project report
- Discussion of activities pertaining to two different classes and subjects.
- Activities on infusion of appropriate concerns

Semester-I
ARTS AND AESTHETICS

Contact Time: 2 per week
Five point Grade (Internal)

The need to integrate arts education in the formal schooling of our students is to retain our unique cultural identity in all its diversity and richness and encourage young students and creative minds to do the arts. An understanding of the arts will give our youth the ability to appreciate the richness and variety of artistic traditions as well as make them liberal, creative thinkers and good citizens of the nation. Keeping in view some of these ideas the National Curriculum Framework-2005, introduced arts education **as a mainstream curricular area**, which must be taught in every school as a compulsory subject (up to class X) and facilities for the same may be provided in every school. Keeping this in view, it is all the more important that arts education is integrated in the school curriculum to provide an aesthetically viable atmosphere in schools encouraging creativity. For this, not only the art teachers but every teacher should be sensitive to appreciate this.

Objectives

The aim of teaching arts education in school may be perceived as a tool for development of aesthetic sensibility among learners to enable them to respond to the beauty in different forms. Thus, inclusion of the curricular area of arts in education in for student learners will contribute significantly in the overall development of their personality as well as make their teaching more effective. This may be achieved by learning different art forms as well as knowing about them and through student's own participation, community help and building up of certain core facilities. Thus, the broader objectives of learning should be able to make them;

- **express freely** their ideas and emotions about different aspects of life through different art forms.
- learn to **appreciate** different art forms and distinguish them.
- develop an **insight** towards sensibility and aesthetic appreciation and become more **creative and conscious** about the good and beautiful in their environment, including classroom, school, home and community through an integrated learning approach.
- integrate the **knowledge of art** with daily life through learning with different media and techniques by using creative expression and making objects of common use.
- make learners **conscious** of rich cultural heritage of their own region as well as that of the nation.
- get acquainted with the life and work of artists.

Course Components: This course as part of the two year B. Ed. programme should consist of theory, practical, project work and workshop. Also, the arts need to be applied in day to day life from designing classroom materials to notice board, cultural festivals, theme based celebrations, national days to festivals etc. where everyone will participate. These occasions will be a forum for students' activities where intra relation of all the art forms will manifest on a single occasion.

Theory

- Concepts and forms of arts and crafts- an introduction: what do we mean by arts and crafts, which contain visual and plastic art forms, performing art forms, and heritage crafts.
- Significance of art in education: why art forms are important for learning?
- Integrating arts and crafts in school curriculum as a pedagogical support/ resource: education through arts and crafts is an interesting method which may be integrated in regular learning that leads to skills, observation, analysis, synthesis, evaluation, and problem solving.

- Different ways/methods to integrate arts in education: during the curriculum transaction, different strategies can be adopted.
- Historical perspectives of arts in education: reflections on importance of arts education by thinkers and educators in 20th century.
- Current thinking and practices in arts education: various researches and NCF-2005.
- Knowing about local art and craft forms: the diversity of India's arts and crafts at the local/ regional level and its integration in the curriculum.

Practical
- Activities related to doing arts, including application of arts in the immediate environment. Small activities, which enhances the skills including the communication and presentation skills, brings in imagination, creativity and aesthetic sensibility among the student teachers.
- Application of aesthetic and design sensibility in the day to day life, in their profession and environment are some of the practical aspects, which needs to be taken care of. During the celebrations of festivals, functions, special days etc. this should be reflected.

Project:
The student teacher can take a theme-based project from any of the curricular areas covering its social, economic, cultural and scientific aspects integrating various art and craft forms. Also, they can do an analysis of textbooks - where they can find a scope either in the text or in the form of activities or exercises to integrate art forms. They can also document processes of an art or craft form from the pedagogical point of view; such as weaving or printing of textiles, making of musical instruments, folk performances in the community etc. - how the artists design their products, manage their resources including raw materials, market it, what problems do they face as all these aspects involve historical, social, economic, scientific and environmental concerns.

Modes of Learning Engagements:
- **Classroom** environment should be interactive and discussions should take place where student teachers can document each others' experiences as an artist and connoisseur both. How arts in education can be
- **Attending** exhibitions and performances, interacting with artists and craft persons, watching and listening art related films, audio and video materials available on different performers, regional/ folk art forms etc. may also be shown from time to time. These will not only create awareness but also an appreciation for arts forms and bring in aesthetic sensibility and related values among the student teachers.
- **Projects and assignments** may be given for individual learners as well as for group work.
- **Workshops** may be conducted at least once in each year where student teachers can get a first hand experience of working with artists, handle different materials and media, learn about different aspects of an art form on how it relates to the society and community and can be used as pedagogical tool to transact

Grading:
    A = Excellent
    B= Very Good
    C = Good
    D = Average
    E=Poor

Modes of Assessment:
The engagement of teacher-learners in the above set of experiences will be quantitatively and qualitatively evaluated, based on observations and submissions of projects and assignments and an overall grade should be assigned that covers: a) submission of work b) participation c) creative potential displayed d) application of aesthetic and design sensibility in campus events or in other course work.

Scheme of Examination in Botany (Honours)
B.Sc. B. Ed.

Semester-I	**Examination**	
Paper 1.1:	Plant Diversity-I (Terminal-60,Sessional-15)	75 marks
Paper 1.2:	Practical	25 marks

SEMESTER-I
Botany Paper 1.1: Plant Diversity-I

Contact Hours per Week : 4
Examination Duration : 3 Hours
Maximum Marks : 75 (Terminal-60, Sessional-15)

Objectives:

On completion of the course the students will be able to:

- explain the structure and economic importance of *Virus, Bacteria* and *Cyanobacteria*.
- recognize the economic importance of microbes in daily life.
- expand the diversities of plant life.
- describe the life cycle pattern and affinities of Algae, Fungi.
- discover the diseased plant in field condition.
- narrate the evolutionary pattern and economic importance of Algae, Fungi and Lichen.

UNIT-I

Diversity of Plant : Definition, scope and Classification of the Kingdom : Basic concepts of Evolution and Plant Diversity.

Viruses : Structure, multiplication and economic importance of viruses.

Bacteria : Structure, nutrition, reproduction and economic importance.

Cyanobacteria : General account, thallus organisation and economic importance.

UNIT-II

General characters: Classification, economic importance and affinities of Algae.

Structure, reproduction life history and systematic positon of *Volvox, Oedogonium* and *Chara*.

UNIT-III

Important features and life history of *Vaucheria, Ectocarpus Polysiphonia*.

General account of Bacillariophyceae.

UNIT-IV

General characters, Classification, Nutrition and Economic importance of fungi.

Structure, Reproduction, Life history and Systematic position of *Albugo, Mucor, Penicillium, Puccinia* and *Alternaria*.

General account of Lichens (Structure, Reproduction and Economic importance).

UNIT-V

General account of plant pathogens, host pathogen interactions

Major diseases of plants and their control (blast and blisat of rice, rust and smut of wheat, downy mildew and tikka disease of groundnut, citrus canker and powdery mildew).

References:
1. Smith, G.M., 1971, Cryptogrammic Botany, Vol.I, Algae and Fungi, Tata   McGraw Hill Publishing Co. New Delhi.
2. Sharma, P.O., 1991, The Fungi, Rastogi and Co., Meerut
3. Dube, H.C., 1990, An Introduction to Fungi, Vikas Publishing House, Pvt. Ltd, New Delhi.
4. Clifton, A., 1958, Introduction to the Bacteria, McGraw Hill and Co, New York.
5. Bold, H.C., Alexopoulous, C.J. and Delevoryas, T., 1980, Morphology of Plant and Fungi (4th Edn) Harper and Row Co., New York.
6. Kumar, H.D., 1988, Introductory Phycology affiliated East- West Press Ltd., New York.
7. Mandahar, C.L., 1998, Introductions to Plant Viruses, Chand and Co., Ltd. Delhi.
8. Sharma, O.P., 1992, Text book of Thallophytes, McGraw Hill Publishing Co.

Botany Paper 1.2 (Practical)

Contact Hours Per Week	:	2
Examination Duration	:	3 hours
Maximum Marks	:	25 (Expt.18, Viva-4, Record-3)

Objective :

- To enable students to do practical work based on the syllabus.
- Acquaint practical techniques used to investigate the life processes.
- To enable the students to gain inside basic laboratory procedures, process and techniques.

Suggested Laboratory Exercises

1. Study of the plant types included under algal and fungi.
2. Observation of disease symptoms in hosts infected by fungi, viruses and bacteria. Slide preparation of diseased material and identification of pathogens.
3. Gram-staining techniques of bacteria
4. Study of various types of Lichen thalli.

SCHEME OF EXAMINATION IN CHEMISTRY (HONOURS)
B.Sc.B.Ed.

Semester-I	**Examination** (Terminal-60, Sessional-15)	75 marks
Paper 1.1	**Gaseous State of Matter, Atomic Structure & Peridic Table. Isomerism**	
Unit 1: (Physical)	: Gaseous state of matter	
Unit 2: (Inorganic)	: Atomic Structure, Electronic configuration	
Unit 3: (Inorganic)	: Long form of Periodic Table and Periodic properties	
Unit 4: (Organic)	: Introduction to Organic Chemistry	
Unit 5: (Organic)	: Isomerism of Organic Compounds with special emphasis on Stereoisomerism	
Paper 1.2	Practical	25 marks

Semester-VIII	Examination (Terminal-60, Sessional-15)	75 marks
Paper 8.1	**Nuclear Chemistry, Non-aqueous Solvents,**	
	Organometallic Compounds, Polypeptides & Nuclic Acids	

Unit 1: (Physical)	:	Nuclear Chemistry
Unit 2: (Inorganic)	:	Non-aqueous Solvents
Unit 3: (Inorganic)	:	Organometallic Compounds
Unit 4: (Organic)	:	Amino acids, Proteins
Unit 5: (Organic)	:	Nucleic acids

Paper 8.2	Practical	25 marks
	(Honours) (Terminal-60, Sessional-15)	**75 marks**
Paper 8.3	**Quantum Mechanics, Photochemistry, Metal Carbonyls**	

Unit 1: (Physical)	:	Elementary Quantum Mechanics
Unit 2: (Physical)	:	Photochemistry
Unit 3: (Inorganic)	:	Metal Carbonyls & Nitrosyls
Unit 4: (Organic)	:	Application of Spectroscopy - I
Unit 5: (Organic)	:	Application of Spectroscopy - II

| Paper 8.4 (Honours) | Practical | 25 marks |

| | **Total** | **1000 Marks** |

SEMESTER-I

Chemistry Paper 1.1: Gaseous State of Matter, Atomic Structure & Peridic Table.
Isomerism

Contact Hours per Week	:	4
Examination Duration	:	3 Hours
Maximum Marks	:	75 (Terminal-60, Sessional-15)

Objectives:

On completion of the course the students will be able to

- explain the behaviour of real gases
- describe the conditions required for liquifaction of gases.
- describe Bohr atomic model.
- understand the important features of the quantum mechanical model of atom.
- state the de Broglie relation and Heisenberg uncertainty principle.
- define an atomic orbital in terms of quantum numbers.
- state aufbau principle, pauli exclusion principle and Hund's multiplicity rule.
- write the electronic configurations of atom.
- understand the significance of atomic number and electronic configuration as the basis for peri classification.
- classify elements into s, p, d, f blocks and learn their main characteristics.
- recognize the periodic trends in physical and chemical properties of elements.
- compare the reactivity of elements.
- write the IUPAC nomenclature or organic compounds.
- understand the structure of organic compounds.
- understand the concept of stereoisomerism
- differentiate between types of stereoisomerism

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Unit I: Gaseous state of matter:

Kinetic molecular theory, derivation of kinetic gas equation, deduction of gas laws from kinetic gas equation, gas constant. Behaviour of real gases, vander waals equation of state. Qualitative discussion of Maxwell's distribution of molecular velocities and energy (derivation excluded), molecular velocities – root mean square, average, most probable velocities. Liquifacation of gasses and critical phenomena, Laws of corresponding state, collision number, collision diameter, mean free path.

Unit II: Atomic Structure

Recapitulation of Bohr's Theory, Sommerfeld's model, wave nature of matter, de Broglie's equation, Heisenberg's uncertainty principle, probablity and shapes of orbitals, Schrodinger's wave equation. Significance of Ψ & Ψ^2. Quantum numbers. probability distribution curves. Shapes of s, p, d, f orbitals. Aufbau principle and Pauli exclusion principle, Hund's multiplicity rule. The slater's rule and its application, Screening effect, Effective nuclear charge, electronic configuration of atoms.

Unit III: Long form of periodic table and periodic properties

Division of elements into s, p, d, f, blocks, covalent radii, and vander waals radii ionic radii, ionisation enthalpy, electron gain enthalpy, electrongativity (definition, methods of determination and trends in periodic table and applications in predicting and explaining chemical behaviour).

Unit IV: Introduction to Organic Chemistry

Classification, IUPAC nomenclature and Structure of organic compounds. Concept of hybridization of carbon, Orbital representation of methane, ethane, ethyne, benzene. Homologous series – general trends in properties and structure in these homologue series

Unit V: Isomerism of Organic Compounds with special emphasis on stereo-isomerism – Concept of isomerism, Types of isomerism

a) **Optical isomerism-** elements of symmetry, molecular chirality, writing the Fischer projection and flying wedge formulae. Illustration of inter-conversion of one type of structural representation into another type of formulaes. Enantiomers, dia-stereomers, stereogenic centre, optical activity, properties of enantiomers, optical purity, chiral and achiral molecules with two stereogenic centres, threo and erythro designation, meso compounds, resolution of enantiomers by salt forming method, inversion, retention and racemization.
Relative and absolute configuration, sequence rules, D & L and R & S systems of nomenclature.

b) **Geometrical isomerism –** determination of configuration of geometric isomers, cis–trans and E&Z system of nomenclature, geometric isomerism in oximes and alicyclic compounds.

c) **Conformational isomerism-**conformational analysis of ethane and n-butane; conformations of cyclohexane, axial and equatorial bonds, conformation of mono and di substituted cyclohexane derivatives. Newman projection and Sawhorse formula,
Difference between configuration and conformation.

Chemistry Paper 1.2: Practical

Contact Hours Per Week : 2
Examination Duration : 3 Hours
Maximum Marks : 25 (Expt.-18, Viva-4, Record-3)

Objectives:

On completion of the course, the students will be able to:

- identify cations and anions present in the salt mixture,

1. **Inorganic Chemistry:** Qualitative analysis of inorganic salt mixture (only colourless salts in absence of interfering ions).

SCHEME OF EXAMINATION IN MATHEMATICS (HONOURS)
B.Sc.B.Ed.

FIRST YEAR

Semester-I   Examination

Paper-1.1 **Calculus, Ordinary Differential Equation and Analytical Solid Geometry**

a)	Calculus	25 marks
b)	Ordinary Differential Equations	20 marks
c)	Analytical Solid Geometry	15 marks
	Sessional	15 Marks
Paper-1.2	Practical	25 marks

SEMESTER-I

athematics Paper-1.1 : Calculus, Ordinary Differential Equation and Analytical Solid Geometry

ntact Hours per week : 4

amination Duration : 3 Hours

ximum Marks : 75(Terminal-60, Sessional-15)

jectives :

After studying this paper, students should be able to –

- define the terms curvature and asymptote,
- derive the formulae for curvature and asymptote in different forms,
- develop the strategy to trace the graphs of different curves,
- define the terms rectification, quadrature, volume and surface area of solid of revolution,
- derive the formulae for rectification, quadrature, volume and surface area of solid of revolution,
- solve problems based on above knowledge,

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- solve the ordinary differential equations of the first and second order in different forms and apply these to solve some practical problems,
- develop an understanding of laplace transformation,
- acquire the knowledge of different equations of sphere, cones and cylinders and solve real life problem on them.

Calculus

Unit-I

Curvature, Asymptotes. Tracing of curves (Cartenary, Cycloid, Folium of Descartes, astroid, limacon, cissoid and loops)

Unit-II

Rectification, quadrature, Volume and surface area of solids of revolutions.

Books Recommended :

1. Textbook of Calculus, Part-II – Shantinarayan, S. Chand and Co., Ch.8 (Art 24, 25 & 26)
2. Textbook of Calculus, Part-III – Shantinarayan, S. Chand and Co., Ch.1 (1 & 2), 3, 4 (Art 10-12 omitting Simpsons Rule), 5 (Art 13) and 6 (Art 15).

Ordinary Differential Equations

Unit-III

Ordinary differential equations of 1st order and 1st degree (variables separable, linear homogenous, exact), Equations of 1st order and higher degree.

Unit-IV

Second order linear equation with constant coefficients, homogeneous forms second order equation with variables coefficients, variation of parameters, Laplace Transformations and its application to solutions of differential equations.

Books Recommended :

1. A course of Ordinary and Partial differential equations – Dr. J. Sinnaroy and Dr. S. Padhy, Kalyani Publisher, Ch.2.1 to 2.7), 3, 4 (4.1 to 4.7), 5, 9, (9.1, 9.2, 9.4, 9.5, 9.10, 9.11, 9.13)

Analytical Solid Geometry

Unit-V

Sphere : Plane section of a sphere, intersection of two spheres, sphere with a given diameter. Equation, sphere through a given circle.

Cones and Cylinders : Definition, Equation of a cone with a conic as guiding curve. The Right circular cone, its definition and equation. Definition and Equation of Cylinder Enveloping cylinders. Definition and Equation of right circular cylinder.

Conicold : General equation of conicold, shapes of some surfaces.

Books Recommended :

1. Analytical Solid Geometry – Shanti Narayan and P. K. Mittal, S. Chand and Co.
    Chapters : 6(6.3, 6.3.1, 6.3.2, 6.3.3, 6.4, 6.4.1, 6.5, 6.6, 6.6.1, 6.7, 6.7.1), 7 (7.1), 7.1.1, 7.1.2, 7.2, 7.4, 7.4.1, 7.4.2, 7.6, 7.6.1, 7.7, 7.7.1, 7.6, 7.8.1, 7.8.2), 8 (8.1, 8.2, 8.3, 8.3.1, 8.3.2, 8.3.3)

Mathematics Paper-1.2: Practical

Contact Hours per week	:	2
Examination Duration	:	3 Hours
Maximum Marks	:	25

List of Activities

- Activity oriented problem solving/ experiments based on the content studied in Paper 1.1
- Mathematics project
- Seminar

SEMESTER II

SCHEME OF EXAMINATION IN PHYSICS (HONOURS)
B.Sc.B.Ed.

Semester-I	**Examination**	
Paper 1.1:	Vector Analysis, Gravitational Interaction, and	
	Properties of Matter(Terminal-60, Sessional-15)	75 marks
Paper 1.2:	Practical	25 marks

Physics Paper 1.1: Vector Analysis, Gravitational Interaction, and Properties of Matter

Contact Hours per Week   :   4

Examination Duration   :   3 Hours

Maximum Marks   :   75 (Terminal-60, Sessional-15)

Objectives:

On completion of the course the students will be able to

- apply vector analysis to different relevant problems,
- distinguish between different coordinate systems,
- solve second order differential equations and related problems,
- calculate gravitational fields and potential for different bodies,
- Improve understanding of different properties of matter like elasticity, surface tension and viscosity.

Unit 1: Vector Analysis - I

Scalar product and vector product of vectors. Triple scalar product. Vector triple product. Differentiation of vectors with respect to scalars. Expressions for position, velocity and acceleration vectors of a particle. Gradient, divergence, curl: definitions, physical meaning and operations. Laplacian of a scalar.

Unit II: Vector Analysis - II

Ideas of line, surface and volume integrals. Gauss's, Stokes' and Green's theorems. Length element, area element and volume element in different coordinate systems. Curvilinear coordinate systems. Expressions for gradient, divergence and curl in Cartesian, spherical and cylindrical coordinates.

Unit III: Second Order Differential Equations

Second order differential equations with variable coefficients. Linear independence of solutions. Series solution of linear oscillator. Legendre differential equation and its series solution. Legendre polynomial and recurrence relations. Bessel equation, its solution and recurrence relations.

Unit IV: Gravitational Interaction

Gravitation as a fundamental force of nature. Inertial mass and gravitational mass. Gravitational field and potential due to (i) a spherical shell, and (ii) a solid sphere. Variation of acceleration due to gravity owing to rotational motion of the earth. The principle of equivalence. Earth's satellites: characteristic velocity, energy relations in launching a satellite. Global positioning system (GPS).

Unit V: Properties of Matter

Derivation of relations among elastic constants. Torsion of a right circular cylinder. Bending of beams. Vibration of loaded cantilever. Surface tension: pressure difference across curved surfaces and pressure inside a liquid drop and bubble. Poiseuille's formula for steady flow of a viscous liquid: derivation and significance

References:

1. Vector Analysis – M. R. Spiegel (Schaum Series, McGraw Hill)
2. Mathematical Methods for Physicists – G. B. Arfken (Academic Press)
3. Mathematics for Physicists and Engineers – H. A. Pipes (Tata McGraw Hill)
4. Mathematical Physics – B. S. Rajput (Pragati Prakashan)
5. Mathematical Physics – Satyaprakash (Sultan Chand)
6. Essential of Mathematical Physics – P. C. Naik (Kalyani Publishers)
7. Mechanics and Properties of Matter – F. Tyler (Edward Arnold)
8. Classical Mechanics and General Properties of Matter–S.N. Maiti and D.P. Raichaudhury (New Age International)
9. Classical Mechanics of Particles and Rigid Bodies – K. C. Gupta (New Age International)
10. The Feynman Lectures on Physics, Vol. I (Narosa Publishing House)
11. Properties of Matter – F. H. Newman and V. H. L. Searle (Orient Longman)
12. Properties of Matter – D. S. Mathur (S. C. Trust)
13. Physics, International student edition – Marcelo Alonso, Edward J. Finn, (Addison Wesley-1999)

Physics Paper 1.2: Practical

Contact Hours per Week	:	2
Examination Duration	:	3 Hours
Maximum Marks	:	25(Expt-18, Viva-4, Record-3)

Objectives:

On completion of the course, the students will be able to:

- develop the skill of doing experiments related to properties of matter,
- handle apparatus for doing different experiments in Physics,
- develop the skill of observation and measurement.

List of Experiments:

1. To determine modulus of rigidity of the given rod by Barton's apparatus
2. To measure viscosity of water by capillary flow method
3. To determine Poisson's ratio of rubber
4. To determine Young's modulus by Searle's apparatus
5. To determine Young's modulus of the material of a rectangular bar by bending
6. To measure surface tension of water
7. To determine Young's modulus of wood (a wooden metre scale) by vibration of cantilever
8. To determine viscosity of castor oil by Stokes' method
9. To determine modulus of rigidity, Young's modulus and Poisson's ratio of the material of a flat spiral spring
10. To determine the coefficient of volume expansion of air using constant pressure air thermometer

SCHEME OF EXAMINATION IN ZOOLOGY (HONOURS)
B.SC. B.ED.

FIRST YEAR

SEMESTER-I	Examination	
Paper-1.1	Animal Diversity-I(Terminal-60, Sessional-15)	75 marks
Paper-1.2	Practical	25 marks

SEMESTER – I
Zoology Paper-1.1: Animal Diversity-I

Contact Hours per Week   :   4
Examination Duration   :   3 Hours
Maximum Marks   :   75 (Terminal-60, Sessional-15)

Objectives :

- The prospective teacher trainee would be able to -
- understand the diversity of form, structure and function of the invertebrate organism varying from simple protozoans to complex annelid metazoans,
- appreciate the habits, habitats and lie history of different invertebrates,
- state classification of the various phyla upto class and order level with suitable examples,
- appreciate the affinities and phylogenetic positions of the organisms/ groups,
- gain an understanding of the vital life processes that sustain the organisms.

Unit-I : Animal classification and Protozoa

Principles of classification, outline classification of animal kingdom upto phyla.

Protozoa – General characters and classification of Protozoa up to classes with examples. Type study : *Paramecium* – External and internal structure, physiology. Locomotion, osmoregulation, nutrition and reproduction in Protozoa.

Unit-II : Porifera

General characters and classification of Porifera up to order with examples.

Type study : *Sycon* – habit and habitat, morphology, body wall and canal system, physiology, asexual and sexual reproduction. Canal system in Porifera (Ascon type, Sycon type, Rhagon type and Leucon type). Skeleton in sponges.

Larval forms in Porifera.

Economic importance of sponges.

Unit-III : Coelenterta and Ctenophora

Coelenterata : General characters and classification of Coelenterata up to order with examples.

Type study : *Aurelia* – habit and habitat, external and internal structure, physiology, reproduction.

Mesenteries in Metridium.

Polymorphism in Coelenterata.

Coral and coral reefs - types, formation, theories and importance.

Ctenophora : General characters, structure and affinities.

Unit-IV : Platyhelminthes and Nemathelminthes

Platyhelminthes : General characters and classification of the phylum upto order with examples : (a) Type study : *Fasciola hepatica* – external and internal structure, digestive, excretory, nervous and reproductive system, life history and parasitic adaptations; (b) Type study : *Taenia solium* – external and internal structure, physiology, nervous system, reproductive system, life cycle.

Nemathelminthes : General characters and classification of the phylum upto order with examples. Type study : *Ascaris* – external and internal structure, digestive, excretory and reproductive systems and life-cycle. Parasitism and Parasitic Adaptations in the helminthes.

Unit √ : Annelida

General characters and classification of the phylum upto order with examples.

Type study : *Nereis* – external and internal structure, coelome, locomotion, digestive, blood vascular, excretory, nervous, reproductive systems and life history.

Nephridial system and coelomoduct in Annelids.

References:

1. Barington, E.J.W. (1969) Invertebrates Structure and Function, Oliver and Boyd, London.
2. Hall, R.P. (1953) Protozoology, New Yorik.
3. Harner, S.F. and Shipley, A.E. (1895-1909) The Cambridge Natural History, Macmillan and Co., London.
4. Hyman, L.H. (1967) The Invertebrates, McGraw Hill, New York.
5. Parker T.J. and Haswell, W.A. (1974) Textbook of Zoology. Invertebrates, The Macmillan Press, London.
6. Sedgwick, Adam (1968) A Students' Textbook of Zoology, Central Book Depot, Allahabad.
7. Meglitsch, P.A. (1967), Invertebrate Zoology, Oxford University Press, New York.
8. Mohanty, P.K. (2000) Illustrated Dictionary of Biology, Kalyani Publishers, Ludhiana.
9. Starer, T.I. and Usinger, R. (1957) General Zoology, New York.

Zoology Paper-1.2 : Animal Diversity-I (Practical)

Contact Hours per Week   :   4
Examination Duration   :   3 Hours
Maximum Marks   :   25 (Expt.- 18, Viva- 4, Record- 3)

Objectives :
The prospective teacher trainee would be able to -

- dissect, display the internal anatomical systems and appreciate the bio-organisation of the organ system inside the organisms,
- identify the diverse invertebrates and be conversant with their habitat and adaptations,
- develop competency to make microscopic preparations for detailed cellular and sub-cellular studies,
- develop abilities to prepare records/illustrations of the various activities carried out in laboratory and prepare field notes on the bio-diversities.

1. Study of permanent slides of Protozoa : *Amoeba, Entamoeba, Euglena, Paramecium, Paramecium* conjugation, *Paramecium* binary fission, *Noctiluca, Plasmodium, Foraminifera, Vorticella.*
2. Culture of protozoans.
3. Study of permanent slides and museum specimens of Porifera, *Leucosolinia, Sycon, Spongilla,* sponge spicules, *Hyalonema, Euspongia,* sponge gemmules, L.S. of Sycon and T.S. of Sycon.
4. Mounting of temporary slides of sponge spicules and gemmules.
5. Study of permanent slides and museum specimens of Coelenterata :
   Hydra, Hydra with bud, *Hydra* with gonad, *Obelia* colony, *Obelia* medusa, *Porpita, Physalia,* Ephyra larva, *Metridium,* T.S. of *Metridium, Aurelia, Gorgonia, Pennatula.*
6. Study of specimens and slides of Platyhelminths, *Fasciola hepatica, Tenia solium, Planaria,* different segments of *T. solium* (scolex, mature, gravid), T.S. of *F. hepatica* and different larval stages of *Fasciola.*
   Study of specimens and slides of Nematohelmenthis.
   Male and female of *Ascaris*, T.S. of male and female *Ascaris.*
7. Study of museum specimens and slides of Annelida
   Nereis, Heteronereis, Pontobdella, Chaetopterus, Aphrodite, Sipunculus, Earthworm T.S. through phyarynx, gizzard, intenstie, Leech T.S. through crop and caecum region.
8. Mounting of temporary slides of spermatheca, ovary and nerve ring of earthworm, parapodia of nereis.
9. Dissection of *Pheretima*
   Digestive system and nervous system.