

FIRST YEAR

Course No.	Name of Subject
Course 1	Childhood and Growing up
Course 2	Contemporary India and Education (Including Gender, School & Society)
Course 3	Understanding the Self (Internal Assessment)
Course 4	School Observation
Course 5	Core Subjects*
	a) Gen English.
	b) Environmental Studies
Course 6	Physics I
	Physics II
	Physics III
	Physics Practical
Course 7	Chemistry I
	Chemistry II
	Chemistry III
	Chemistry Practical
Course 8	Zoology I
	Zoology II
	Zoology III
	Zoology Practical
Course 9	Botany I
	Botany II
	Botany III
	Botany Practical
Course 10	Mathematics I
	Mathematics II
	Mathematics III

Course 1 - CHILDHOOD & GROWING UP

Objectives—After completion of the course the student teachers will be able to:-

1. Understand the Developmental characteristics of Childhood and adolescence.
2. Learn the Theories of development.
3. Understand Educational provisions of children at different stages of development.
4. Understand the Concepts and Components of Personality.
5. Know the Techniques of Personality Assessment.
6. Understand the Psycho-Analytic Theory of personality.
7. Understand the Concept and Importance of Mental Health and role of Teacher in Promoting Mental Health.
8. Acquire the Concept of Individual Variation and their Classroom Implications.
9. Understand nature and Characteristics of Intelligence.
10. Understand the Theories of Intelligence.
11. Acquire the skill of Measurement of Intelligence.

COURSE CONTENT

UNIT- I Basic Concepts of Child Development

1. Meaning, Scope and Importance of studying Child Development.
2. Methods of study of Children- Case Study, Observation and Field Studies.
3. Basic Concepts in Child Development-Growth V/S Development, Maturation V/S Learning, Heredity vs. Environment (Family, Neighborhood, School and Community)
4. Principles of Growth and Development
5. Stages of Development.

UNIT- II Childhood

1. Developmental characteristics of Childhood with reference to Physical, Cognitive, Motor, Social, Emotional and Moral aspects.
2. Theories of Development- Piaget (cognitive), Erikson (Psychosocial)
3. Educational Implications of Development during Childhood.

UNIT- III Adolescence

1. Characteristics of adolescence development- Physical, Cognitive, Social and Emotional.
2. Difficulties during transition period- Difficulties in Social Transition, Conflicts, Social Attitude and Behavior, Influence of Peers, Conformity and Self assertiveness and Personality Integration.
3. Impact of Urbanization, Economic, Social and Political changes on the construction and experience of adolescence.
4. Issues in adolescence -
 - Identity crisis;
 - Idealism and Hero worship
 - Gender Issues

- Child Labor
- Changing Family Structures
- Peer Pressures
- Pressure of Competition
- Juvenile Delinquency

5. Critical analysis of significant events e.g. Sexual abuse, Harassment, Gender and Poverty.

6. Guidance and Counselling of adolescents.

UNIT- IV Personality and Mental Health

1. Personality Concept, types and Components of Personality.
2. Psychoanalytic theory of Personality by Freud.
3. Factors affecting Personality development.
4. Assessment of Personality- Projective and Non-Projective Techniques.
5. Mental Health
 - a) Concept and Importance
 - b) Types of Conflicts and Defense Mechanisms
 - c) Role of Teacher in Promoting Mental Health

UNIT - V Individual Variations

1. Concept of Variation and Classroom, Implication with reference to Intelligence, Aptitude, Creativity, Emotional Stability, Social Adjustment, Self Concept and Interest.

2. Introduction to Socially disadvantaged children who are marginalized on account of class, caste, Language, ethnicity or gender, first class generation learners.

(Focus should be to understand how different socio political realities construct different childhoods Within children's lived contexts: Family, Schools, Neighborhood and Community through close Observation and interaction with children of different socio- economic and cultural backgrounds)

Intelligence, Nature and Characteristics

3. Theories of Intelligence

- a) J.P. Guilford Structure of Intellect
- b) Howard Garden's Theory of Multiple Intelligence.
- c) Daniel Goleman's Model of Emotional Intelligence.

4. Measurement of Intelligence Types of Intelligence Tests – Verbal, Non- Verbal and Performance Tests.

SESSIONAL/PRACTICUM

Any Two from the following:

Practicum no.1 is compulsory for all.

1. Administration, Scoring, Interpretation and Reporting of one Mental Ability Test and one Personality Test .Any one from the following:

- 2 Preparation of case history of children from early childhood to adolescence taken from different socio economic and cultural background in the context of family, schools, neighborhood and community.
- 3 Study of any one psychosocial issue related to adolescence (Child labour, Juvenile Delinquency, Pressure of Competition, Gender issues)
- 4 Study of any one issue represented and highlighted by media (sexual abuse and harassment, poverty, gender, child labour etc).

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Course 2- CONTEMPORARY INDIA & EDUCATION
(Including Gender, School & Society)

Objectives: Student teachers will be able to :-

1. Understand the diversified nature of Indian Society.
2. Understand the Marginalization and Inequality present in Indian Society.
3. Understand the Challenges and implications of Social diversity and inequality in school education.
4. Understand the role of Education in grooming children with respect to diversity.
5. Understand the Constitutional promises of freedom Social justice, equality and fraternity.
6. Critically examine the reflection of constitutional values in educational system.
7. Understand the policies related to education in pre and post independent india.
8. Critically examine the implementation of policies on education.
9. Understand the implications of Globalization, Privatization and Liberalization in education.
10. Develop gender sensitivity and understand the gender discrimination in family, school and society.

COURSE CONTENT

UNIT- I Indian Society & Education

1. Meaning, Nature & purpose of Education:
 - a) According to different thinkers i.e, Gandhi, Tagore, Aurobindo, J.krishnamurti, Rousseau and Dewey.
 - b) According to important National documents on Education i.e Education commission (1966) NPE (1986) its revision 1992, NCF (2005),
2. Concept of Social diversity, inequity and Marginalisation and role of Education to cope up with these issues.
3. Universalization of Education/RTE(2009) & its Challenges
4. Globalization, Liberalization, and Privatization and their implications in Education.

UNIT- II Education in India

1. Education in Pre Independence Period/ Macaulay's Minutes/ and major educational polices during preIndependence British Period.
2. Education in Post Independence period-
 - (a) Policies regarding Education in post Independence Period [Specially NPE (1986), RTE (2009)
 - (b) Important national documents on Education – Education commissions (1966), NCF (2005), Learning without burden (Yashpal committee report), NCFTE (2009)
 - (iii) Dellors commission report – relevance to Indian Conditions

UNIT- III – Challenges in Education

1. Language policy
2. Enhancement of quality in Education and role of SSA and RAMSA in this.
3. Increasing enrollment at different stages

UNIT- IV Gender, School and Society

1. (a) Gender Sensitivity and its importance for society
(b) Gender discrimination in Family
(c) Gender discrimination in society
(d) Gender discrimination in Schools
2. Role of Education, family, media and legislation in developing gender parity.

UNIT – V - Values in Education –

1. Values: concept and classification, unity of all life and being); tolerance; Values in modern Indian context with the reference to the Indian Constitution. Rights and Duties of a citizen as stated in constitution.
2. Value Education and role of school. Human rights & danger to Social Security, Role of Education in safe guarding human rights. Activities helpful in Inculcation of values.
3. Environmental Education- Role of teacher in Promoting Conservation of Environment.
4. Education for peaceful and cooperative living.

Practicum/Sessional work

Attempt any two-(One each from following sections)

Section A

1. Term paper on any one Topic/issues related to Education
2. Two abstract of any Two articles related to Education

Section B

1. Prepare a report on Co-curricular Activities of a school supporting Environment protection.
2. Case study of any one institution with reference to gender sensitivity.
3. Prepare a report of a group discussion conducted on language Policy/ Constitutional values/ Globalization/ Liberalization/ Privatization.

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Course 3 - UNDERSTANDING THE SELF

Objectives: After completion of the course, the pupil teachers will be able to:

1. Understand the development of self as a person and as a teacher.
2. Develop sensibilities, dispositions and skills to facilitate personal growth of their students in the classroom.
3. Know the development of self concept and the professional identity.
4. Develop social relational sensitivity.
5. Build resilience within to deal with conflicts.
6. Analyze self identity (one's implicit beliefs, stereotypes and prejudices resulting from gender, culture, assets and limitations of oneself).
7. Become aware of the impact of political, historical, and social forces on their identity formation.
8. Learn and practice effective communication skills.
9. Understand the philosophy of yoga.
10. Practice Yoga to enhance abilities of body and mind.

COURSE CONTENT

UNIT 1: Exploration Into Self

1. Meaning and Nature of Self and Self Concept. Role of Home, Neighborhood, Community, Peer Group, School in their development. Importance of Building social Relations.
 - (a) Pupil teachers are required to explore their own self, self concept and self esteem by Administering tests of self efficacy, Self concept, self esteem and self identity under the Supervision of facilitators and prepare their personality profile.
 - (b) Pupil Teachers will be required to administer above tests to five school students and prepare student profile. On the basis of this profile they are required to prepare a teaching strategy to Enrich self concept, classroom learning and enhance achievement of studentsNote: Records of the above to be submitted for evaluation
2. Self Esteem and Self Identity: Meaning and Nature; Development process: parenting practices, role of caste class, gender, age, religion, school, role models in the development of self esteem and self identity. Development of Teachers Personality: role of social, cultural, Political, academic, Psychological and organisational factors.

Pupil teachers are required to:

- (a) Write down biographies of the best teachers they have come across
- (b) Interview Successful teachers, professionals, businessmen and prepare a report of their interview.
- (c) Collect success stories of high achievers in the field of academics/ sports / athletes/ actors and analyse them to identify their unique personality factors contributing to their success.
- (d) Identify their own best contribution as a teacher, identify challenging situations they have come

across during class room teaching.

Note : Reports of the above will be presented and discussed in the group situation and to be submitted for evaluation.

3. Motivation: Meaning and importance of achievement motivation for achieving excellence.

Importance of Goal Determination and Goal Achievement. Achieving self actualisation in teaching Profession.

(Mode: Workshop in Small Groups)

Identify influences of motives in his/her achievement in schools, college/jobs/personal relations.

Pupil teachers will reflect on their own contribution to enrichment of their family, society and peer group.

UNIT – II Communication

Meaning, nature, types; factors influencing communication: psychological, social, organisational.

Mass Communication: its impact on personality development and classroom learning. Effective listening and its role in the classroom, Characteristics of effective communication (body language, listening behaviour, responding strategies), Mastering Effective Communication.

Workshop of Pupil Teachers to restructure personality through:

- (a) Analysis of one's strengths and weaknesses, beliefs, prejudices, time management, life goals, professional commitment.
- (b) Developing effective listening and observation skills. Student teachers are required to develop in the workshop their personal strategies to enrich inner self as a teacher and stipulate its impact on their students.

UNIT – III Philosophy and use of Yoga

Philosophy of Yoga and its role in well being, use of yoga in different contexts; importance of Meditation; contribution to development of self.

- (a) Practice of Yoga Exercises and Meditation

SESSIONAL WORK

1. Reports of the practicums of the above units.

NOTE: In this paper there will be no external examination. Internally college will conduct a written examination carrying a weightage of 10 marks and a practical examination carrying a weightage of 20 marks, Viva Voce carrying a weightage of 10 marks and 10 marks will be awarded for sessional work.

College will conduct Internally

Total Marks : 50	Internal Assessment : 50
Written Examination	10 Marks
Practical Examination	20 Marks

Viva – Voce	10 Marks
Practicum / Sessional work	10 Marks

REFERENCES

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FIRST YEAR
GENERAL ENGLISH

MM: 50

(Common for Science, Social Sciences and Humanities & Commerce Faculties)

(1) Texts :

1. The Many Worlds of Literature ed: Jasbir Jain: Macmilan India.
2. Animal Farm: By George Orwell

Or

A Vendor of Sweets: By R.K. Narayan

Distribution of Marks :

Marks

1. Current English for Language skills:

15

- (a) Short-answer questions (5 out of 10) each carrying 1 mark = 5 marks
- (b) General questions (2 out of 4) each carrying 4 marks = 8 marks
- (c) Questions on vocabulary = 2 marks

2. Animal Farm or A Vendor of Sweets:

10

- (a) Two questions (out of 4) each question carrying 5 marks = 10 marks

2. Grammar :

13

- (a) Tenses

3

marks

- (b) Modal Auxiliaries

2

marks

- (c) Phrasal Verbs

3

marks

- (d) Clause (Nominal, Adjectival, Adverbial)

2

marks

- (e) Use of Non-finite verbs (Gerunds, Participles and infinitives)

3

marks

3. Comprehension and Composition:

12

- (a) Precis writing

5

marks

- (b) Essay (about 300 words) on one topic out of four topics

7

marks

Books Recommended :

1. Pit Corder: An Intermediate English Grammar

**FIRST YEAR
ENVIRONMENTAL STUDIES**

(Credit Course)

(Compulsory for all Faculties)

The Environmental Studies (Compulsory) Examination shall consist of one theory paper of three hour duration and a field work. The student has to pass in theory as well as in field work separately.

Distribution of Marks	Max. Marks	Min. Pass
Marks		
Theory Paper	75	27
Field Work	25	09
Total	100	36

Pattern of question paper in the examination and distribution of marks :

The Environmental Studies (Compulsory) Examination will have a theory paper consisting two parts, A and B and a field work.

In Part A, total 10 questions will be set in the paper selecting at least one from each unit. Each question to be answered in about 50 words. All questions are compulsory. Each question carries 2.5 marks, total 25 marks.

In Part B, total 10 questions will be set, selecting at least one from each unit. Five questions have to be answered by the student selecting not more one from a unit. Each question to be answered in about 350 words. These questions carries 10 marks each, total 50 marks.

Field Work : Student will have to submit a typed/ hand written report of about 20 pages based on study of a local area of environmental interest. The report will be assessed by an internal examiner under the supervision of Dean/Principal of the College.

Suggested Books:

1. Chaudhary B.L. and J. Pandey (2004) : Environmental Studies (In Hindi), APEX Publishing House, Udaipur.
2. Purohit, S.S., Q.J. Shammi and A.K. Agrawal (2004), A Text Book of Environmental Sciences (In English), Student Edition, Jodhpur.

SYLLABUS

UNIT-1: The Multidisciplinary Nature of Environmental Studies

Definition, Scope and Importance; Need for public awareness (2 lectures).

UNIT-2: Natural Resources

Renewable and Non-renewable Resources: Natural resources and associated problems.

a) Forest Resources: Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forests and tribal people.

b) Water Resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems.

c) Mineral Resources: Use and exploitation, environmental effects of extracting and using minerals resources, case studies.

d) Food Resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.

e) Energy Resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources. Case studies.

f) Land Resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification.

* Role of an individual in conservation of natural resources.

* Equitable use of resources for sustainable lifestyles. **(8 Lectures)**

UNIT-3: Ecosystem

* Concept of an ecosystem

* Structure and function of an ecosystem

* Producers, consumers and decomposers

* Energy flow in the ecosystem

* Ecological succession

* Food chains, food webs and ecological pyramids.

* Introduction, types, characteristic features, structure and function of the following ecosystem -

(a) Forest ecosystem, (b) Grassland ecosystem, (c) Desert ecosystem, (d) Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries) **(6 lectures)**.

UNIT-4 : Bio-diversity and its conservation

* Introduction-Definition: Genetic, species and ecosystem diversity.

* Biogeographically classification of India.

* Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values.

* Biodiversity at global, national and local levels.

* India as a mega-diversity nation

* Hot-spots of biodiversity

* Threats of biodiversity : habitat loss, poaching of wildlife, man-wildlife conflicts.

* Endangered and endemic species of India.

* Conservation of biodiversity : In-situ and Ex-situ conservation of biodiversity **(8 lectures)**

UNIT-5 : Environmental Pollution

Definition:

- * Causes, effects and control measures of : (a) Air pollution; (b) Water pollution; (c) Soil pollution; (d) Marine pollution; (e) Noise pollution; (f) Thermal pollution; (g) Nuclear hazards.
- * Solid Waste Management: Causes, effects and control measures of urban and industrial wastes.
- * Role of an individual in prevention of pollution.
- * Pollution case studies.
- * Disaster management: floods, earthquake, cyclone and landslides. **(8 lectures)**

UNIT-6 : Social Issues and the Environment

- * From Unsustainable to sustainable development
- * Urban problems related to energy
- * Water conservation, rain water harvesting, watershed management
- * Resettlement and rehabilitation of people; its problem and concerns. Case studies.
- * Environmental ethics: Issues and possible solutions.
- * Climatic change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case studies.
- * Wasteland reclamation
- * Consumerism and waste products
- * Environment Protection Act
- * Air (Prevention and Control of Pollution) Act
- * Water (Prevention and Control of Pollution) Act
- * Wildlife Protection Act
- * Forest Conservation Act
- * Issues involved in enforcement of environment legislation
- * Public awareness **(7 lectures)**.

UNIT-7: Human Population and the Environment

- * Population growth, variation among nations
- * Population explosion - Family Welfare Programme
- * Environment and Human Health
- * Human Rights
- * Value Education
- * HIV/AIDS
- * Women and Child Welfare
- * Role of Information Technology in Environment and Human Health
- * Case Studies **(6 lectures)**

UNIT-8 : Field Work

- * Visit to a local area to document environmental assets - river/forest/grassland/hill/mountain
- * Visit to a local polluted site - Urban/Rural/ Industrial/Agricultural
- * Study of common plants, insects, birds
- * Study of simple ecosystems - pond, river, hill slopes etc. (Field work Equal to **5 lecture** hours).

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**COURSE CURRICULAM AND SYLLABUS OF
FOUR YEAR INEGRATED COURSE
PHYSICS
COURSE CURRICULAM**

Paper Code	Paper	Nomenclature	Lectures	Duration of Exam	Max. Marks	Min. Marks
1161	I	Mechanics of Particles, Rigid bodies and Continuous Media	60 hrs	3hrs	50	18
1162	II	Oscillations, Waves and Acoustics	60 hrs	3hrs	50	18
1163	III	Electricity and Magnetism	60 hrs	3hrs	50	18
1164	IV	Practical	120 hrs	6 hrs	50	18

Each theory paper in the annual examination shall have three sections.

Section A shall contain one compulsory question of 5 marks having 10 parts. Two parts shall be set from each unit. The candidate is required to answer each part in about 20 words.

Section B shall contain five compulsory questions of 5 marks each with internal choice .One question with internal choice will be set from each unit .The answer may be given in approximately 250 words.

Section C shall contain four descriptive questions covering all units and candidate has to answer any two questions of ten marks each. The answer may be given in approximately 500 words. There can be two parts in a question from this section.

In total the candidate has to answer eight questions in each theory paper.

FIRST YEAR B.Sc.B.Ed. INTEGRATED COURSE

PAPER-I

MECHANICS OF PARTICLES, RIGID BODIES

AND CONTINUOUS MEDIA

UNIT – I

Laws of motion, conservation of energy and momentum, transformation equations for rotating frame, centripetal and Coriolis accelerations, Coriolis force, Coriolis force due to earth's rotation – experimental demonstration by Foucault pendulum.

Motion under a central force, conservation of angular momentum, Kepler's laws.

UNIT – II

Fields and potential, gravitational field and potential due to spherical bodies, Gauss's and Poisson's equations, gravitational self energy.

Two body problem, reduced mass, scattering and scattering cross sections, illustrations, Rutherford scattering by hard spheres, centre of mass and laboratory reference frames, binary stars.

UNIT – III

System of particles, centre of mass, calculation of centre of mass of regular bodies, angular momentum, equations of motion, conservation theorems for energy, momentum and angular momentum, system of variable mass, elastic and inelastic collisions, rigid body, degrees of freedom, Euler's theorem.

UNIT – IV

Molecular rotations (as rigid bodies), moment of inertia, di and tri atomic molecules, intrinsic spin, precessional motion, motion of top, gyroscope. Elastic constants for an isotropic solid, their inter relation, torsion of a cylinder, bending of beam, applications to cantilever.

UNIT – V

Kinematics of moving fluid, equation of continuity, Euler's law for fluidity.

Viscous fluids, streamline and turbulent flow, flow through a capillary tube, Poiseuille's law, Reynold's number, Stoke's law, theory of rotation viscometer, effect of temperature and pressure on the viscosity of liquids.

Text and Reference Books:

1. E.M. Purcell, Editor, Berkeley Physics Course, Vol. 1, Mechanics, McGraw Hill.
2. R.P. Feynmann, R.B. Lighton, M. Sands, The Feynmann Lectures in Physics, Vol.I, B.I. Publications, Bombay, Delhi, Calcutta, Madras.

PAPER-II

OSCILLATIONS, WAVES AND ACOUSTICS

UNIT - I

Free oscillations of simple systems: Equilibrium; concept of potential well, small oscillations approximation, solutions, linear and transverse oscillations of a mass between two springs, diatomic molecule, reduced mass concept.

Damped and forced oscillations: Damped oscillations; critical damping, Q of an oscillator. Forced oscillator with one degree of freedom; Transient and steady state oscillations, resonance energy absorption, low and high frequency responses.

UNIT - II

Free oscillations of system with two degrees of freedom: Two dimensional oscillator; normal modes, longitudinal and transverse oscillation of coupled masses, energy transfer between modes, coupled pendulum.

Fourier analysis: Fourier series and Fourier coefficients; simple examples (square wave, saw-tooth wave, half and full wave rectifier), use of exponential representation for harmonic oscillations, expression for Fourier coefficients. Non-periodic disturbance; representation by Fourier integral, Fourier transform. Case of a wave train of finite length, constancy of $\Delta x \Delta k$ (the uncertainty product).

UNIT - III

Wave equation: Waves in a one-dimensional chain of particles; classical wave equation; wave velocity, boundary conditions and normal modes, dispersion relations, dispersion waves, acoustic and optical modes.

Waves in continuous media: Speed of transverse waves on a uniform string, speed of longitudinal waves in a fluid, energy density and energy transmission in waves, typical measurements, dispersion in waves, group velocity and phase velocity, their measurements.

Superposition of waves: Linear homogenous equations and the superposition principle, interference in space and energy distribution; beats and combination tones.

UNIT -IV

Ultrasonics: Production, detection, and applications of ultrasonic waves

Vibrations in bounded systems: Normal modes of a bounded system; harmonics, the quality of sound, Chladni's figures, Vibration of a drum. Noise and Music; Limits of human audibility; intensity and loudness, bel and decibel. Music scale and musical instruments.

UNIT - V

Reflection, refraction, and diffraction of sound:

Acoustic impedance of a medium, percentage reflection, and refraction at a boundary, impedance matching for transducers. Diffraction of sound; principle of a sonar system, sound ranging.

Applied acoustics: Transducers and their characteristics, recording and reproduction of sound, measurement of frequency, velocity, waveform, and intensity. The acoustics of halls, reverberation period, Sabine's formula.

Text and Reference Books:

1. Waves and Oscillations, Berkley Physics Course Vol. III

2. Vibrations and waves, I.G. Main (Cambridge University Press)
3. The Physics of Vibrations and Waves, H.J. Pain, McMillan (1975).

PAPER CODE-9343

PAPER-III

ELECTRICITY AND MAGNETISM

UNIT – I

Electric Field: Coulomb's law, unit of charge (SI and other systems of units). Conservation and quantization of charge. Field due to different charge distributions, monopole, dipole, quadrupoles, line charge, sheet charge. Torque on a dipole in uniform field and non-uniform fields, flux of an electric field. Gauss's law - applications to deduce \mathbf{E} fields, force per unit area on the surface of a charged conductor.

Potential: Line integral of electric field and electrical potential. Field as the gradient of potential. Potential energy of a system of charges and its calculation in various configurations. Field equations for \mathbf{E} in vacuum. Energy associated with \mathbf{E} field. Differential form of Gauss's law: Poisson's equation, Laplace's equation, boundary conditions and uniqueness theorems.

Electric field around conductors: induced charges, field and potential inside a conductor, field near the surface of a conductor, method of images.

UNIT – II

Electric fields in matter: atomic and molecular dipoles, induced dipoles, polarizability tensor, electronic and molecular contributions. Electrical field caused by polarized matter, \mathbf{E} and \mathbf{D} fields, permittivity, dielectric constant. Capacitor filled with dielectric, field equations in presence of dielectric. The field of a polarized sphere, dielectric sphere in a uniform field. Energy in dielectric systems. Polarizability and susceptibility, frequency dependence of polarizability, Clausius-Mossotti equation.

Magnetic field: Magnetic field \mathbf{B} seen through Lorentz force on a moving charge, unit for \mathbf{B} field, magnetic dipoles in atoms and molecules, gyromagnetic ratio. Magnetic field due to currents: Biot and Savart's law. Field equations in magnetostatics, Ampere's law. Fields due to a straight wire, magnetic dipole, circular current and solenoid. Magnetic fields in matter. Magnetizing current, magnetization vector, \mathbf{H} and \mathbf{B} fields, magnetic permeability, susceptibility. Comparison of magnetostatics and electrostatics.

UNIT – III

Electrical current: current density and current; nonsteady currents and continuity equations. Electrical conductivity, resistivity, conductance and their temperature dependence. Thermo electric current and dark current, non-ohmic circuitry, thermistor. Varying current. Rise and decay of currents in LR and CR circuits, time constant, integrating and differentiating circuits, electrical shielding. Study of a discrete LC transmission line.

UNIT – IV

Alternating currents: Skin effect for resistance at high frequencies, complex impedance, reactance, impedances of LCR series and parallel circuits, resonance, Q factor, power dissipation and power factor. AC bridges: Anderson's, deSauty's and Owens bridges, Self and mutual inductance. Measurement of mutual inductance by Carry Foster Method, Coupled circuits and Transformers.

UNIT – V

Ballistic Galvanometer (moving coil type), its distinction from beat type. B.G. differential equation and its solution under different conditions of damping. Critical damping, over damping. Logarithmic decrements, charge sensitivity, current sensitivity, determination of B using search coil and B.G. Determination of high resistance using B.G. Factors for sensitivity. B.G. constant. Measurement of mutual inductance by Carey Foster's bridge by B.G. Measurement of small resistance by Kelvin's double bridge.

Text and Reference Books:

1. E.M. Purcell, Ed. Berkely Physics Course, Vol. 1, Electricity and Magnetism McGraw Hill.
2. D. Halliday and R. Resnick, Physics, vol. 2, Wiley Eastern, New Delhi.
3. D.J. Griffiths, Introduction to Electrodynamics, Prentice Hall of India.
4. Reitz and Milford, Electricity and Magnetism, Addison Wesley.
5. A.S. Mahajan and A.A. Rangawala , Electricity and Magnetism, Tata McGraw Hill.
6. A.M. Portis Electromagnetic Fields
7. S.S. Atwood, Electricity and Magnetism, Dover publication.
8. A.F. Kip, Fundamentals of Electricity and Magnetism, International Student Edition, McGraw Hill and Kogakusha,
1969

PAPER-IV
PHYSICS PRACTICALS

Note : Students are expected to perform sixteen experiments in all taking the eight experiments from each section. One experiment from section A and one from section B will be set in the examination paper.

The distribution of marks in the practical examination will be as follows:

(i) Two experiments 30 Marks

For each experiment, distribution of marks will be as follows:

Figure :	2
Formula/Theory :	2
Observation :	7
Calculation and Result :	3
Precautions :	1

(ii) Viva voce 10

(iii) Records 10

Total **50 Marks**

LIST OF EXPERIMENTS

Section-A

1. Determination of elastic constants Y , α , β and K by Searle's method.
2. Determination of thermal conductivity 'K' of a bad conductor by Lee's method.
3. Determination of J by Callender and Barne's method.
4. Study of temperature variation of surface tension by Jaegers method.
5. Study of free fall of a body: use of a digital timer to get time and velocity at different depth and analysis.
6. Study of collision in two dimension
7. Kater's pendulum, precise setting, analysis and determination of value of acceleration due to gravity 'g' at a place.
8. Study of damping of a bar pendulum under various kinds of damping mechanisms.
9. To determine coefficient of damping k , relaxation time T and quality factor of a damped SHM using a simple pendulum.
10. Study of dependence of period of oscillations of a spring or rubber band on mass and spring constant.
11. To determine the velocity of sound in air at room temperature with Kundt's tube.
12. Using scattering to deduce the nature of potential hump or well (two dimensional)
- 13 Study of laws of parallel and perpendicular axes for estimation of moment of inertia.
14. Computer simulation of equations of motion for a system of particles.
15. Computer simulation of molecular rotations, as rigid bodies.
16. Study of motion of a top and a gyroscope.
17. Study of torsion of a wire; dependence on radius, length, torque and material (static method)
18. To determine the modulus of rigidity of the material of a wire by statistical method using Bortan's apparatus

19. To determine the value of modulus of rigidity of the material of a given wire by dynamical method using Maxwell's
needle
20. Study of flow of liquids through capillaries: laminar and turbulent flow stages, capillaries
21. To determine the coefficient of viscosity of water by Poisevill's method
22. Studying the fall of solids through a liquid.
23. To determine the coefficient of viscosity of a liquid (glycerene or castor oil) by Stoke's method
24. Study of air flow through a capillary : U- tube with a long capillary fitted on one arm, mercury level
difference
pushing air.
25. To determine Poisson's ratio of rubber

SECTION -B

1. Calibration of Carey Fosters bridge wire and determination of the specific resistance of the material of the given wire.
2. Measurement of thermo e.m.f.
3. To study growth and decay of current in R.C. circuit and determine the time constant.
4. To determine impedance of L-R circuit and find phase relation ship in current and voltage.
5. To determine the constants of a ballistic galvanometer. Current and charge sensitivity, time period, log decrement and
galvanometer resistance.
6. To determine intensity of magnetic field using search coil and ballistic galvanometer.
7. To determine high resistance by method of leakage. Measure leakage resistance of a condenser.
8. To determine low resistance by Kelvin's double bridge.
9. Determination of dielectric constant of a given liquid.
10. To determine inductance of a coil using Anderson's method.
11. Desauty's bridge method for comparison of two capacitors.
12. To determine mutual inductance by Carry Foster's Method
13. Study of the impedance of a capacitor of varying frequencies to measure C.
14. Response curve for LCR circuits series resonance.
15. Study of a discrete LC transmission line.
16. Response curve for LCR circuit parallel resonance
17. Measurements of electric charge and related quantities using an electrometer.
18. Study of potential distribution in a given geometrical configuration.
19. Mapping of electric fields for specified configurations.
20. Study of magnetic field using a vibration magnetometer.
21. Study of the rise and decay of current in a RL circuits.
22. Characteristics of a choke.
- 23 Study of the impedance of an inductor at varying frequencies to measure R and L

FIRST YEAR B.Sc CHEMISTRY 2016-17

Effective from session 2016-2017

The examination shall consist of three theory papers and one practical.

Paper & Course	Hrs/Week	M. Marks
Paper - I Inorganic Chemistry	2	50
Paper - II Organic Chemistry	2	50
Paper - III Physical Chemistry	2	50
Practical	4	50

PAPER I : INORGANIC CHEMISTRY

Time : 3 Hrs.

M.M. 50

UNIT I

Covalent Bond: Valence bond theory and its limitations, directional characteristics of covalent bond, various types of hybridization and shapes of simple inorganic molecules and ions. Valence Shell Electron Pair Repulsion (VSEPR) theory, regular and deviation from regular geometry, MO theory, homonuclear and heteronuclear (CO, NO, HF and HCl) diatomic molecules, multi center bonding in electron deficient molecules, bond strength and bond energy, percentage ionic character from dipole moment and electronegativity difference.

Ionic Solids : Ionic structures, radius ratio effect and coordination number, limitation of radius ratio rule, lattice defects, semiconductors, lattice energy and Born Haber cycle, solvation energy and solubility of ionic solids, polarizing power and polarizing of ions. Fajan's rule, Metallic bond - free electron, valence bond and band theories.

Weak Interactions: Hydrogen bonding, Van der Waals forces.

UNIT II

s-Block Elements : Comparative study, diagonal relationships, salient features of hydrides, solvation and complexation tendencies including their function in bio-systems, an introduction to metal alkyls and aryls.

Chemistry of Noble Gases : History of discovery, separation of inert gases, chemical properties of the noble gases, chemistry of xenon, structure and bonding in xenon compounds.

UNIT III

Group 13 : General properties, oxides, hydroxide, halides and hydrides of boron, diborane and higher boranes, borohydrides, borazine, oxyacids of boron, borax and borax bead test.

Group 14 : General properties, inert pair effect, halides, oxides, silicates, silicones, graphitic compounds, carbides, cyanides and carbonyls, brief idea of fullerenes.

Group 15 : General properties, hydrides, azides, halides, oxides and oxyacids of phosphorous, nitrogen fixation, fertilizers.

UNIT IV

Group 16 : General properties, polymorphism, hydrides, halides, oxides and oxyacids of sulphur, thiosulphuric acid and salts, thionic acids and their salts, tetrasulphur tetranitride.

Group 17 : General properties hydrogen halides, oxides and oxyacids of halogens, interhalogen compounds polyhalides, basic properties of halogens.

UNIT V

Non-Aqueous Solvents : Physical properties of a solvent, types of solvents and their general characteristics, Differentiating and leveling solvents, reactions in non-aqueous solvents with special reference to liquid NH_3 and liquid SO_2 .

Acids and Bases : Arrhenius, Bronsted - Lowry, Lax - Flood, solvent system and Lewis concepts of acid and bases, Usanovitch definition.

BOOKS RECOMMENDED

1. Concise Inorganic Chemistry : J.D. Lee
2. General Inorganic Chemistry : J.A. Duffy, Longman (2nd Ed.)
3. Principles of Inorganic Chemistry : B.R. Pun and L.R. Sharma.
4. Basic Inorganic Chemistry : F.A. Cotton and G. Wilkinson, Wiley Eastern.
5. Molecular Geometry : R.J. Gillespie, Van Nostrand Reinhold.
6. Inorganic Chemistry (Hindi ed.) : Suresh Ameta, A. Sharma and M. Mehta, Himanshu Publication.

PAPER CODE-9346

PAPER II : ORGANIC CHEMISTRY

Time : 3 Hrs.

M.M. 50

UNIT I

Structure and Bonding : Localized and delocalized chemical bond, Van der Waals interaction, charge transfer complexes, resonance, hyperconjugation, aromaticity electrometric, inductive and field effects, hydrogen bonding.

Mechanism of Organic Reactions : Curved arrow notation, drawing electron movements with arrows, half-headed and double-headed arrows, types of organic reactions, energy considerations.

Reactive Intermediates : Carbocations, carbanions, free radicals, carbenes, arynes and nitrenes, their formation and stabilities.

Methods of determination of reaction mechanism (product analysis, intermediates, isotope effects, kinetic and stereochemical studies).

UNIT II

Stereochemistry of Organic Compounds : Concept of isomerism, types of isomerism.

Optical Isomerism : Elements of symmetry, molecular chirality, enantiomers, stereogenic centre, optical activity, properties of enantiomers, chiral and achiral molecules with two stereogenic centers, diastereomers, threo and erythro diastereomers, meso compounds, resolution of enantiomers, inversion, retention and racemization.

Relative and absolute configuration. sequence rules. D and L, R and S systems of nomenclature. Geometric isomerism- determination of configuration of geometric isomers. E and Z system of nomenclature, geometric isomerism in oximes and alicyclic compounds.

Conformational isomerism- conformational analysis of ethane and n-butane; conformations of cyclohexane, axial and equatorial bonds, conformation of mono substituted cyclohexane derivatives. Newman projection and Sawhorse formulae, Fischer and Flying Wedge formulae.

Difference between configuration and conformation.

UNIT III

Alkanes : General methods of formation, physical & chemical properties. Mechanism of free radical substitution in alkanes with reference to halogenation, orientation, reactivity and selectivity.

Cycloalkanes : Nomenclature, methods of formation, chemical reactions, Baeyer's strain theory and its limitation, ring strain in small rings (cyclopropane and cyclobutane), theory of strainless rings, the case of cyclopropane ring: banana bond.

Alkenes, Dienes and Alkynes : Brief introduction of alkenes, their formation with reference to mechanisms of dehydration of alcohols and dehydrohalogenation of alkyl halides, regioselectivity in alcohol dehydration The Saytzeff rule, Hofmann elimination, physical properties and relative stabilities of alkenes.

Chemical Reactions of Alkenes : mechanisms involved in hydrogenation, electrophilic and free radical additions, Markownikoff's rule, hydroboration-oxidation, Oxymercuration-reduction, epoxidation, ozonolysis, hydration, hydroxylation and oxidation with KMnO_4 polymerization of alkenes, substitution at the allylic and vinylic positions of alkenes, industrial applications of ethylene and propene.

Nomenclature and Classification of Dienes : Isolated, conjugated and cumulated dienes, structure of allenes and butadiene, methods of formation, polymerization, chemical reactions- 1,2 and 1,4- additions, Diels - Alder reaction.

Alkynes : Acidity of alkynes, mechanism of electrophilic and nucleophilic addition reactions, hydroboration, metal-ammonia reductions, oxidation and polymerization.

UNIT IV

Arenes and Aromaticity : Nomenclature of benzene derivatives, the aryl group, aromatic nucleus and side chain, structure of benzene, molecular formula and Kekule structure, stability and carbon - carbon bond lengths of benzene, resonance structure, and M.O. picture.

Aromaticity : The Huckel rule, aromatic ions. Aromatic electrophilic substitution: General pattern of the mechanism, role of s and p complexes. Mechanism of nitration, halogenation, sulphonation, mercuration and Friedel-Craft reaction. Energy profile diagrams. Activating and deactivating substituents, orientation and ortho-para ratio. Side chain reactions of benzene derivatives, Birch reduction, Methods of formation and chemical reactions of alkylbenzenes. alkynylbenzene and biphenyl.

UNIT V

Alkyl and Aryl Halides : Nomenclature and classes of alkyl halides, methods of formation, chemical reactions, mechanism of nucleophilic substitution reactions of alkyl halides, S_N^2 and S_N^1 reactions with energy profile diagrams, factors affecting S_N^2 and S_N^1 reactions. Haloform reaction, Freons :

Methods of formation of aryl halides, nuclear and side chain reactions, the addition - elimination and elimination - addition reaction, mechanisms of nucleophilic aromatic substitution reactions.

Relative reactivities of alkyl halides v/S allyl, vinyl and aryl halides, synthesis and uses of DDT and BHC.

BOOKS RECOMMENDED

1. A Text Book of Organic Chemistry : K.S. Tiwari, S.N. Mehrotra and N.K. Vishnoi.
2. Modern Principles of Organic Chemistry : M.K. Jain and S.C. Sharma
3. A Text Book of Organic Chemistry : (Vol. I and II), O.P. Agarwal.
4. A Text Book of Organic Chemistry : B.S. Bahl and Arun Bahl.
5. A Text Book of Organic Chemistry : P.L. Soni.
6. Organic Chemistry : (Vol. I, II and III), S.M. Mukherji, S.P. Singh and R.P. Kapoor, Wiley Eastern Ltd., (New Age International).
7. Organic Chemistry, Morrison and Boyd, Prentice Hall.
8. Organic Chemistry (Hindi Ed.) : Suresh Ameta, P.B. Punjabi and B.K. Sharma, Himanshu Pub.

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PAPER III : PHYSICAL CHEMISTRY

UNIT I

Mathematical Concepts : - Logarithmic relations, curve sketching, linear graphs and calculation of slopes, differentiation of function like k_x , e^x , x^n , $\sin x$, $\log x$, maxima and minima, partial differentiation and reciprocity relations, integration of some useful/relevant functions, permutations and combinations, factorials, probability.

Computers : General introduction to computers, different components of a computer, hardware and software, input-output devices, binary numbers and arithmetic, introduction to computer languages, programming operating systems.

UNIT II

Gaseous State : Postulates of kinetic theory of gases, deviation from ideal behavior, Van- der Waals equation of state.

Critical Phenomena : PV isotherms of real gases, continuity of states, the isotherms of Van der Waals equation, relationship between critical constants and Van der Waals constants, the law of corresponding states, reduced equation of state.

Molecular Velocities : Root mean square, average and most probable velocities, qualitative discussion of the Maxwell's distribution of molecular velocities, collision number, mean free path and collision diameter, liquefaction of gases (based on Joule - Thomson effect).

Liquid State : Intermolecular forces, structure of liquid (a qualitative description).

Liquid Crystals : Difference between liquid crystal, solid and liquid, classification, structure of smetic, nematic and cholestric phases, theory of liquid crystals and its applications, thermography and seven segments cell.

UNIT III

Solid State : Definition of space lattice, unit cell, Bravias lattices.

Laws of crystallography : (i) Law of constancy of interfacial angles (ii) Law of rationality of indices, Weiss and Miller indices (iii) Law of symmetry, symmetry elements in crystals classification of crystals, X-ray diffraction by crystals derivation of Bragg equation, determination of crystal structure of NaCl, KCl and CsCl (Laue's method and powder method).

Colloidal State : Definition of colloids, classification of colloids.

Solids in liquid (sols): Properties - kinetic, optical and electrical, stability of colloids, protective action, Hardy - Schuize law, gold number.

Liquids in Liquid (emulsions): Types of emulsions, preparation. emulsifier, Liquids in solid (gels)- classification, preparation and properties inhibition, general applications of colloids.

UNIT IV

Nuclear and Radiochemistry : Elementary idea of nucleus, nuclear forces, packing fraction, mass defect and binding energy, nuclear fission and fusion reactions, calculation of Q - values of nuclear reactions, liquid drop and shell models of nucleus, theory of radioactivity, G.M. Counter, half life period, average life, radioactive disintegration, radioactive steady state, group displacement law, radioactive series, separation and identification of isotopes, application of radioactivity and radioactive tracers.

UNIT V

Atomic Structure : Dual nature of electron, De Brogue equation, Davission and Germer experiment. Heisenberg uncertainty principle, Schrodinger wave equation, significance of ψ and ψ^2 , probability distribution curves shapes of s, p and d - orbitals, Zeeman and Stark effects.

Physical Properties and Molecular Structure : Physical properties of liquids, vapour pressure, measurement of vapour pressure, heat of vaporization, Trouton's rule.

Surface tension, measurement of surface tension.

Viscosity and its measurement, effect of temperature on the surface tension and viscosity, use of these properties in determination of chemical constitution.

BOOKS RECOMMENDED

1. Principles of Physical Chemistry: B.R. Puri and L.R. Sharma.
2. A Text Book of Physical Chemistry: A.S. Negi and S.C. Anand.
3. Physical Chemistry, Pt. I & II : C.M. Gupta, J.K. Saxena and M.C. Purohit.
4. Physical Chemistry (Hindi Ed.) : Suresh Ameta, R.C. Khandelwal, R. Ameta and J. Vardia, Himanshu Pub.
5. Computers and Applications to Chemistry, Ramesh Kumari, Narosa Publishing House Pvt. Ltd.

PAPER CODE-9348

FIRST YEAR CHEMISTRY PRACTICALS 2016-17

Time : 5 Hrs (One day)

M.M. 50

Distribution of Marks

Exercises		Marks
1.	Semi-micro analysis of Inorganic mixture containing five radicals (excluding Na^+ and K^+)	10
2.	(i) Detection of extra element (N, S and halogen) if any and functional groups in given sample organic compounds.	7
	(ii) Purification of the given organic compounds by crystallization (charcoal) sublimation and determination of its m.p. OR Determination of mixed melting points using urea-cinnamic acid mixtures of given compositions.	7
3.	One Physical Chemistry Experiment	10
4.	Vice-voce	8
5.	Records	8
Total		50 marks

LIST OF EXPERIMENTS

1. **Semi-micro Analysis of Inorganic mixture:** The mixture shall contain **Five** radicals (at least two cations and two anions) soluble in water or in HCl. Two cations of the same group except IIA and IIB may be given. Not more than one interfering radical may be given. Interfering radical may not be given with typical anion combinations.
2. (i) Detection of extra elements (N,S. and halogen) ,one organic compound from the following functional groups be given for identification:
Carboxylic acids, Phenols, Alcohols, Carbohydrates, Aldehydes, Ketones, Nitro.
Compounds : Amino compounds, Anilides Amides, Esters, Thiomide,
Hydrocarbons, Halogen containing compounds.
(ii) **Crystallization :**
Concept of induction of crystallization.
Phthalic acid from hot water (using fluted filter paper and stemless funnel)

Acetanilide from boiling water.

Naphthalene from ethanol

Benzoic acid from water

Decolourization and crystallization using charcoal : Crystallization and decolourization of impure naphthalene (100 g of naphthalene mixed with 0.3 g of Congo Red using 1 g decolourizing carbon) from ethanol.

Simple Sublimation : Camphor, Naphthalene, Phthalic acid and Succinic acid.

Criteria of purity: Determination of M.P., B.P., Mixed M.P.

- 3. Physical Chemistry Experiments :** Any one of the following experiments may be given in the examination.

Ionic equilibria

- a) Measurement of pH of different solutions like aerated drinks, fruit juices, shampoos and soaps (use dilute solutions of soaps and shampoos to prevent damage to the glass electrode) using pH-meter.
- b) Preparation of buffer solutions and measurement of the pH of buffer solutions and comparison of the values with theoretical values of following buffers.
 - (i) Sodium acetate-acetic acid
 - (ii) Ammonium chloride-ammonium hydroxide

Colloids : To prepare arsenious sulphide sol. and compare the precipitating power of mono-, bi- and trivalent anions.

Viscosity and Surface Tension

- (i) To determine the percentage composition of a given mixture (non-interacting systems) by viscosity method.
- (ii) To determine the percentage composition of a given binary mixture by surface tension method.
- (iii) To determine the parachor value of $-\text{CH}_2-$ group.
- (iv) To determine the rheochor value of $-\text{CH}_2-$ group.

Transition Temperature

- (i) Determination of transition temperature of the given substance by thermometric/ dilatometric method (e.g. : $\text{MnCl}_2 \cdot 4\text{H}_2\text{O}$, $\text{SrBr}_2 \cdot 2\text{H}_2\text{O}$).

Thermochemistry

- (i) To determine the solubility of benzoic acid at different temperatures and to determine ΔH of the dissolution process.
- (ii) To determine the enthalpy of neutralisation of a weak acid/weak base versus strong base/strong acid and determine the enthalpy of ionisation of the weak acid/weak base.
- (iii) To determine the enthalpy of solution of solid calcium chloride and calculate the lattice energy of calcium chloride from its enthalpy data using Born-Haber cycle.

Virtual experiments (any two)

- (i) Purification of organic / inorganic compounds by crystallization / sublimation.
- (ii) Preparation of biodiesel from vegetable oil.
- (iii) Fractional distillation of crude oil / coal .
- (iv) Conformational analysis of alkanes/ cycloalkanes.
- (v) Any other virtual experiment related to the content of syllabus and availability of the experimental facilities.

BOOKS RECOMMENDED

1. Practical Chemistry - Giri, Bajpai and Pandey, S. Chand & Co. Ltd., New Delhi.
2. Laboratory Manual in Organic Chemistry, R.K. Bansal, Willey Eastern.
3. Experimental Organic Chemistry, Vol. I and II, P.R. Singh, D.S. Gupta and K.S. Bajpai, Tata McGraw Hill.
4. Experiments in Physical Chemistry - J.C. Ghose, Bharti Bhawan.
5. Experiments in General Chemistry, N.r. Rado and U.C. Agarwal, Eastern Press.
6. Practical Chemistry - Suresh Ameta and P.b. Punjabi, Himanshu Publication.

FIRST YEAR T. D.C. SCIENCE, 2018-19

ZOOLOGY

The first year TDC examination shall consist of three theory papers, each of three hours duration and a practical examination of five hours duration.

	<u>Marks</u>
Paper-I: Life and Diversity of Animals-I (Invertebrates)	50
Paper-II : Cell Biology	50
Paper-III : Developmental Biology	50
Practical :	50

Pattern of question paper in the annual examination and distribution of marks:

Each theory paper in the annual examination shall have three sections i.e. A,B, and C. In section A, total 10 questions will be set in the paper, selecting at least two from each unit. These questions are to be answered in a word or so. All questions are compulsory. Each question carries 0.5 mark, total 05 marks.

In section B, there shall be total 10 questions, selecting two questions from each unit, five questions to be answered by the student selecting at least one from each unit. Answer should be given in approximately 250 words. Each question carries 05 marks, total 25 marks.

In section C, 04 descriptive type questions will be set in the examination paper from five units of the syllabus of the paper, selecting not more than one question from a unit. Each question may have two sub divisions. Students are required to answer any two questions approximately in 500 words. Each question is of 10 marks, total 20 marks.

FIRST YEAR T. D.C.SCIENCE, 2018-19

ZOOLOGY

PAPER-I: LIFE AND DIVERSITY OF ANIMALS-I (INVERTEBRATES)

Duration : 3 hours

M.M. 50

UNIT- I

- 1 General characters and classification of Protozoa and Porifera (up to classes) with examples.
- 2 Type study: Paramecium. Parasitic protozoans and their Pathogenesis
- 3 Type study-Sycon.
- 4 Canal system in sponges.

UNIT-II

- 5 General characters and classification of Coelenterata and Ctenophora
- 6 Type study-Obelia.
- 7 Corals and coral reefs - their formation, kinds and importance. Polymorphism in Coelenterates, Metagenesis.
- 8 Affinities of Ctenophora

UNIT-III

- 9 General characters and classification of Platyhelminthes (upto classes) and Aschelminthes (upto phyla)
- 10 Type study –Fasciola , Taenia
- 11 Concept of pseudocoelom
- 12 General characters and classification of Nematoda (upto classes)
- 13 Type study: Ascaris
- 14 Endoparasites in relation to human diseases, parasitic adaptations of trematodes, cestodes, and nematodes.

UNIT-IV

- 15 General characters and classification of Annelida and Arthropoda (up to classes) with examples.
- 16 Concept of metamerism, segmentation and coelom
- 17 Type study-Pheretima, Periplaneta.
- 18 Economic importance of arthropods

UNIT-V

- 19 General characters and classification of and Mollusca and Echinidermata (up to classes) with examples.
- 20 Type Study –*Pila and Asterias*
- 21 Concept of Torsion and its importance
- 22 Echinoderm larvae.

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FIRST YEAR T.D.C.SCIENCE, 2018-19

ZOOLOGY

PAPER II : CELL BIOLOGY

Duration : 3 hours

M.M. 50

UNIT -I

- 1 Cell theory and its modern interpretation
- 2 Structure, function and general characteristics various types of cells
- 3 Prokaryotic and eukaryotic cells.

UNIT -II

- 4 Various models and hypothesis in understanding the structure of plasma membrane (Overton, Danielli and Davison, Robertsons and Fluid mosaic model)
- 5 Functions of plasma membrane and membrane transport
- 6 Cell cytoskeleton-Microtubule, Microfilament and Intermediate Filament.
- 7 Structure and function Cilia, flagella, Centriole and basal bodies.
- 8 Brief idea of cell cycle (General description of mitosis and meiosis).

UNIT -III

- 9 Structure and function of nucleus and nucleolus.
- 10 Nucleic acids: Watson and Crick model of DNA, chemical nature of DNA and replication of DNA.
- 11 Chemical nature and structure of various types of RNAs and basic concept of transcription

UNIT -IV

- 12 Structure and function of Ribosome
- 13 Structure and function of Endoplasmic Reticulum (Rough and Smooth)
- 14 Basic concept of Protein Synthesis.

UNIT -V

- 15 Structure and function of Golgi. Concept of GERL system.
- 16 Structure and function of Mitochondria and Peroxisomes.
- 17 Structure, function and polymorphism of Lysosomes.

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FIRST YEAR T.D.C. SCIENCE, 2018-19

ZOOLOGY

PAPER- III : DEVELOPMENTAL BIOLOGY

Duration : 3 hours

M.M. 50

UNIT -I

- 1 Aims and scope of developmental biology. Brief historical review and concepts of Embryology.
- 2 Neuroendocrine regulation of reproductive organs in brief.
- 3 Gametogenesis: Spermatogenesis and structure of sperm, oogenesis and structure of ovum, types of ova.

UNIT -II

- 4 Fertilization: Main events of fertilization, acrosome reaction, polyspermy preventing mechanisms.
- 5 Errors in fertilization and significance of fertilization. Parthenogenesis (In brief)
- 6 *In vitro* fertilization and test tube baby.
- 7 Embryo transplant.

UNIT -III

- 8 Cleavage: planes, patterns & types of cleavage.
- 9 Blastulation: Types of blastulae.
- 10 Gastrulation: fate maps, morphogenetic movements and their significance in gastrulation. Mechanism and main characteristic of gastrulation.

UNIT -IV

- 11 Elementary knowledge of fate of three germ layers.
- 12 Primary organizer and embryonic induction, concept of competence.
- 13 Determination, differentiation; Main characteristics of growth and regeneration.
- 14 Regeneration.

UNIT -V

- 15 Extra embryonic membranes: Development and functions.
- 16 Placentation: Definition, types, classification on the basis of morphology and histology. Functions of placenta.

FIRST YEAR T.D.C. SCIENCE – 2018-19

ZOOLOGY: PRACTICAL

Duration : 5 hours

M.M. 50

<u>S.No.</u>	<u>Exercise</u>	
1	Major dissection	10
2	Cell Biology/ Developmental Biology exercise	05
3	Mounting/ Slide preparation	04
4	Spots(10)	15
5	Viva-voce	8
6	Record	8
Total :-		50

Major Dissection marks will be given only if virtual dissection is available otherwise marks may be given according to availability of dissection alternate.

1. General survey of invertebrates (museum specimens):

The student is required to know classification, habit and habitat, economic importance etc.

- A Protozoa : *Entamoeba, Polystomella, Monocystis, Euglena, Noctiluca, Trypanosoma, Nyctotherus, Paramecium, Vorticella,*
- B Porifera : *Scypha, Hyalonema, Euplectella, Spongilla, Euspongia.*
- C. Coelenterata : *Physalia, Aurelia, Alcyonium, Corallium, Gorgonia, Pennatula, Madrepora, Metridium*
- D Platyhelminthes : *Dugesia, Fasciola, Taenia, Schistosoma, Dracunculus,*
and
Aschelminthes *Ascaris (male and female), Wucheraria, Enterobius*
- E Annelida and : *Nereis Heteronereis, Aphrodite, Arenicola, Chaetopterus*
Hirudinaria.
- F Onychophora : *Peripatus.*
- G Arthropoda : *Limulus, Aranea, Palamnaeus, Lepas, Balanus, Apus, Sacculina, Eupagurus, Carcinus, Lepisma, Pediculus, Bombyx, Apis, Cimex, Julus, Scolopendra, Ixodes.*
- H Mollusca : *Mytilus, Chiton, Teredo, Turbinella, Laviculus, Limax, Doris, Aplysia, Dentalium, Nautilus, Sepia, Octopus, Loligo, Pecten, Solen, Pinctada.*
- I Echinodermata : *Asterias, Pentaceros, Antedon, Ophiothrix, Holothuria.*

J Hemichordata : *Balanoglossus, Saccoglossus.*

II. Study of the permanent slides, sections passing through different regions of animals and developmental stages.

- 1 Protozoa : Blood smears showing malarial parasite. *Paramecium*: Binary fission, conjugation.
- 2 Porifera : T.S. and L.S. of *Sycon.*, spicules, spongin fibres and gemmules
- 3 Coelenterata : *Obelia* (colony and medusa), planula, scyphistoma and ephyra larvae of *Aurelia*, T.S. of mesentery of *Metridium*
- 4 Platyhelminthes : Miracidium, sporocyst, redia and cercaria larvae of *Fasciola*, scolex of *Taenia*, W.M. of mature and gravid proglottids of *Taenia*, hexacanth and cysticercus larvae of *Taenia*.
- 5 Aschelminthes : T.S. of *Ascaris*.(male and female)
- 6 Annelida : T.S. of *Nereis* through different regions, parapodia of *Nereis* and *Heteronereis*. Trochophore larva.
- 7 Arthropoda : V.S. of compound eye, nauplius, zoea, megalopa larvae and *Mysis*
- 8 Mollusca : T.S. of gill lamella and T.S. of shell of *Lamellidens*, glochidium larva.
- 9 Echinodermata : T.S. of arm, tube feet and pedicellaria, bipinnaria larva of starfish, echinopluteus larva.
- 10 Hemichordata : *Torneria* larva.

III Dissections: Various systems of preserved animals/Virtual dissection

Virtual dissection of Digestive, Blood Vascular, Excretory, Reproductive system of Frog Rat/Rabbit (if facility of virtual is made available by University)

1. *Pheretima* : General anatomy, digestive, nervous, excretory and reproductive systems.
2. *Palaemon* : Appendages, general anatomy, digestive system and nervous system.
3. *Cockroach* : Mouth parts, Alimentary canal and Reproductive system (only after permission from institutional animal ethical committee otherwise virtual)

IV Mountings: Permanent preparation of the following:

- 1 Protozoa : *Euglena, Paramecium*, ciliates, *Polystomella*.
- 2 Porifera : Sponge spicules, spongin fibres and gemmules.
- 3 Coelenterata : *Obelia* (colony and medusa)
- 4 Platyhelminthes : Proglottid of *Taenia*.
- 5 Annelida : Parapodia of *Nereis* and *Heteronereis*, ovary, septal nephridia and setae (*in situ*) of earthworm.
- 6 Arthropoda : Statocyst and hastate plate of prawn, salivary glands and tracheae of cockroach, W.M. of *Cyclops, Daphnia*, mouth parts of any 4 insects *Culex, Anopheles* male and female, housefly, cockroach and honey bee.
- 7 Mollusca : Gill lamella, glochidium larva, osphradium and radula of *Pila*.

Cell Biology

1. Prepared slides of mitochondria, Golgi bodies, centrosome, different stages of mitosis.
2. Buccal smear preparation for localization of mitochondria and Golgi complex using vital stains.
3. Preparation of Mitosis.
4. Squash preparation of polytene chromosomes.

Developmental Biology: Slides and specimen

- 1 W.M of eggs, early cleavage stage, T.S. of blastula and gastrula of frog.
 - 2 Study of chick embryo: 18 hours, 24 hours, 36 hours, 48 hours and 72 hours.
 - 3 T.S. of ovary and testis.
 - 4 Sperm smear to study the structure of sperm.
 - 5 Foetus with placenta.
- The teacher concerned will provide e-materials to practical in the form of video or demonstrations or written materials including dissections.

REFERENCE BOOKS (LATEST EDITIONS):

LIFE AND DIVERSITY OF ANIMALS (INVERTEBRATES)

- 1 Hickman C.P.Jr., F.M. Hickman and L.S. Roberts, Integrated Principles of Zoology, Mosby College Publication. St. Louis.
- 2 Ayyar, E.K. and T.N. Ananthakrishnan, Manual of Zoology, Vol.1 (Invertebrata), Parts I and II. S, Viswanathan (Printers and Publishers) Pct. Ltd., Madras.
- 3 Jordan, E.L. and P.S. Verma, Invertebrate Zoology, S.Chand & Co. Ltd., Ram Nagar, New Delhi. (English and Hindi Editions).
- 4 Parker and Haswell, Text Book of Zoology, Vol.1, (Invertebrata), A.Z.T.B.S. Publishers and Distributors, New Delhi- 110051
- 5 Ismail, S.A., Vermicology: The Biology of Earthworms, Orient Longman, India.
- 6 Kotpal, R.L. Agarwal and Khetrapal: Modern Text Book of Zoology: Invertebrates, Rastogi Publications, Meerut. (English and Hindi Editions)
- 7 Storer, T.I. and Usinger, K.L.: General Zoology, Tata McGraw- Hill Publishing Co., New Delhi.
- 8 Simpson, G.G.: Principles of Taxonomy, Oxford and IBH Publisher Co. New Delhi.

CELL AND DEVELOPMENTAL BIOLOGY :

- 9 Alberts, Bray, Lewis, Raff, Roberts and Watson, Molecular Biology of the Cell (Garland).
- 10 Balinsky, An Introduction to Embryology (CBS College Publishers)
- 11 Grant: Biology of Developing systems (Holt, Reinhart and Winston).
- 12 Gilbert: Developmental Biology (Sinauer)
- 13 Alberts, B., et al., Molecular Biology of the Cell (Garland)
- 14 Lodish, H., et al., Molecular Cell Biology (Freeman).

PRACTICAL :

- 15 Verma, P.S., A manual of practical Zoology S.Chand and Co. Ltd., Ram Nagar, New Delhi (English and Hindi Editions).
- 16 Lal, S.S.: Practical Zoology , Invertebrates, Rastogi Publication, Meerut (English and Hindi Editions).

PAPER CODE-9353

FIRST YEAR B.Sc.B.Ed.INTEGRATED COURSE

BOTANY

Papers	No.	of	No. of Periods	Max. Passing	Min. Passing

		Papers	in a Week	Marks	Marks
Paper- I	Algae, Lichens and Bryophytes	1	3	50	18
Paper – II	Mycology, Microbiology and Plant Pathology	1	3	50	18
Paper – III	Palaeobotany, Pteridophytes & Gymnosperms	1	3	50	18
PRACTICALS		1	6	50	18

Duration of examination of each theory paper 3 hrs.

Duration of examination of practical 5 hrs. (in one day)

PAPER-I

ALGAE, LICHENS AND BRYOPHYTES

Unit-1

General characters, thallus organisation, pigments and reserve food material in algae. Electron microscopic structure of *Chlamydomonas* and the Cyanophycean cell. Fritsch's Classification and modern trends in classification. Morphology, reproduction and evolutionary relationships in the following: Cyanophyta : *Oscillatoria*, *Nostoc*. Chlorophyta : *Chlamydomonas*, *Volvox*, *Hydrodictyon* and *Cladophora*.

Unit-2

General characters of Xanthophyta, its relationship with Chlorophyta, Morphology and reproduction in Xanthophyta : *Vaucheria*; Chlorophyta : *Coleochaete* and *Oedogonium*; Charophyta : *Chara*. General account of Bacillariophyceae.

Unit-3

Morphology & reproduction in Phaeophyta: *Ectocarpus*; Rhodophyta: *Polysiphonia*. Economic importance of algae. Lichens: Important features, structure, habitat, importance as colonisers and indicators of environment. Vegetative multiplication and life cycle of *Parmelia* and *Usnea*.

Unit-4

General characters and classification of Bryophytes. The evolutionary trends in thallus structure and sporogonium. Morphology and life history of *Riccia*, *Marchantia*, *Pellia*, *Porella* and *Anthoceros*.

Unit-5

Morphology, life history and relationships of *Sphagnum* and *Polytrichum*. Economic importance of Bryophytes.

Note:

The paper setter is required to set questions of 3 types contained in 3 Sections (**Section A**- 10 questions, **Section B**- 10 questions and **Section C**- 4 questions) from the 5 units of each paper. There will be 10 questions in **Section A** which will be asked from all the 5 units, i.e., 2 questions from each unit. These questions have to be answered in one word or a few words only. Each question will be of half mark . All the questions in **Section A** are compulsory. In **Section B**, 10 questions will be set from the 5 units, i.e., 2

questions from each unit. Students are required to attempt at least 1 question from each unit. Each question will carry 5 marks. The answers of each question should be given in about 250 words. In **Section C** there will be 4 descriptive type questions set from all the 5 units, not more than 1 question from each unit. These questions may also have subdivisions. The students are required to answer 2 questions, each in approximately 500 words. Each question will carry 10 marks.

In short, pattern of question paper and distribution of marks for UG classes will be as under :

Section A: 10 questions, 2 questions from each unit, short answer, all questions compulsory.

Total marks: **05**

Section B: 10 questions, 2 question from each unit, 5 question to be attempted, at least 1 from each unit, answer approximately in 250 words.

Total marks: **25**

Section C: 04 questions (question may have subdivision), not more than 1 question from each unit, descriptive type, answer in about 500 words, 2 questions to be attempted.

Total marks: **20**

PAPER CODE-9354

PAPER-II

MYCOLOGY, MICROBIOLOGY AND PLANT PATHOLOGY

Unit-1

Characteristics and broad classification of fungi. Structure and life history of *Albugo*, *Penicillium*, *Phyllactinia* and *Morchella*. Elementary knowledge of Mycorrhizae and their symbiotic significance.

Unit-2

Structure and life history of *Puccinia*, *Ustilago*, *Agaricus* and *Alternaria*. Economic importance of fungi : food, industries, medicine and biological controls.

Unit-3

Characteristics, classification, structure and reproduction of bacteria. Isolation and pure culture of bacteria, Gram's staining. Salient features of Micro-biology of water, soil and food.

Unit-4

Characteristics, structure and economic importance of Mycoplasma. Viruses: Nature, structure, transmission and multiplication of plant viruses.

Unit-5

Principles of plant pathology. Methods of disease control. Important symptoms of plant diseases of the following : Green ear disease of Bajra. Loose smut of Wheat, Black Rust of Wheat, Citrus canker. Little leaf of *Solanum melongena* (Brinjal). Yellow vein mosaic of Bhindi, Tikka disease of ground nut.

Note :

The paper setter is required to set questions of 3 types contained in 3 Sections (**Section A**- 10 questions, **Section B**- 10 questions and **Section C**- 4 questions) from the 5 units of each paper. There will be 10 questions in **Section A** which will be asked from all the 5 units, i.e., 2 questions from each unit. These

questions have to be answered in one word or a few words only. Each question will be of half mark . All the questions in **Section A** are compulsory. In **Section B**, 10 questions will be set from the 5 units, i.e., 2 questions from each unit. Students are required to attempt at least 1 question from each unit. Each question will carry 5 marks . The answers of each question should be given in about 250 words. In **Section C** there will be 4 descriptive type questions set from all the 5 units, not more than 1 question from each unit. These questions may also have sub-divisions. The students are required to answer 2 questions, each in approximately 500 words. Each question will carry 10 marks .

In short, pattern of question paper and distribution of marks for UG classes will be as under :

Section A : 10 questions, 2 questions from each unit, short answer, all questions compulsory. Total marks : **05**

Section B : 10 questions, 2 question from each unit, 5 question to be attempted, at least 1 from each unit, answer approximately in 250 words. Total marks : **25**

Section C: 04 questions (question may have sub-division), not more than 1 question from each unit, descriptive type, answer in about 500 words, 2 questions to be attempted. Total Marks : 20

PAPER CODE-9355

PAPER-III

PALAEOBOTANY, PTERIDOPHYTES AND GYMNOSPERMS

Unit-1

Characteristics and broad classification of pterido-phyta. Stellar system in pteridophytes. Geological Time Scale. Types of fossils, process of fossilization. Applied aspects of Palaeobotany. Structure of *Rhynia* and *Williamsonia*.

Unit-2

Occurrence, structure and life history of *Psilotum*, *Lycopodium* and *Equisetum*.

Unit-3

Occurrence, structure and life history of *Selaginella* and *Marsilea*. Homospory, heterospory and origin of seed habit.

Unit-4

General characters, economic importance and broad classification of Gymnosperms, occurrence, structure of life history of *Cycas*.

Unit-5

Occurrence, structure and life history of *Pinus* and *Ephedra*.

Note :

The paper setter is required to set questions of 3 types contained in 3 Sections (**Section A**- 10 questions, **Section B**- 10 questions and **Section C**- 4 questions) from the 5 units of each paper. There will be 10 questions in **Section A** which will be asked from all the 5 units, i.e., 2 questions from each unit. These questions have to be answered in one word or a few words only. Each question will be of half mark . All the questions in **Section A** are compulsory. In **Section B**, 10 questions will be set from the 5 units, i.e., 2 questions from each unit. Students are required to attempt at least 1 question from each unit. Each question will carry 5 marks . The answers of each question should be given in about 250 words. In **Section C** there

will be 4 descriptive type questions set from all the 5 units, not more than 1 question from each unit. These questions may also have sub-divisions. The students are required to answer 2 questions, each in approximately 500 words. Each question will carry 10 marks .

In short, pattern of question paper and distribution of marks for UG classes will be as under :

Section A : 10 questions, 2 questions from each unit, short answer, all questions compulsory. Total marks : **05**

Section B : 10 questions, 2 question from each unit, 5 question to be attempted, at least 1 from each unit, answer approximately in 250 words. Total marks : **25**

Section C : 04 questions (question may have sub-division), not more than 1 question from each unit, descriptive type, answer in about 500 words, 2 questions to be attempted. Total marks : **20**

PAPER CODE-9356

PRACTICALS

The practical exercises have been divided into following two groups based on the theory papers as detailed below:

Group-I Algae, Fungi, Lichens, Microbiology and Plant Pathology.

Group-II Bryophytes, Pteridophytes, Gymnosperms and Palaeobotany.

GROUP I

Microscopic preparations and study of following algal materials: *Nostoc*, *Oscillatoria*, *Chlamydomonas*, *Volvox*, *Coleochaete*, *Hydrodictyon*, *Cladophora*, *Oedogonium*, *Vaucheria*, *Chara*, *Ectocarpus* and *Polysiphonia*.

Study of different types of Lichen specimens.

Microscopic preparation and study of following fungal materials : *Albugo*, *Phyllactinia*, *Morchella*, *Penicillium*, *Ustilago*, *Agaricus*, *Puccinia* and *Alternaria*.

Study of some locally available materials showing plant diseases caused by Viruses, Mycoplasma, Bacteria and Fungi in field/ laboratory. Yellow vein mosaic of Bhindi, Little leaf of *Solanum melongena* (Brinjal), Citrus canker, Green ear disease of bajra, Rust and Smut of wheat and White rust of crucifers.

GROUP II

Study of external and internal morphology and micro-scopic preparations of following Bryophytes : *Riccia*, *Marchantia*, *Plagiochasma*, *Pellia*, *Anthoceros*, *Sphagnum* and *Polytrichum*.

Microscopic examination of fossil slide specimens/ photographs: *Rhynia* and *Williamsonia*.

Temporary, double stained microscopic preparations and study of stem/ rhizome, anatomy of following pteri-dophytes: *Psilotum*, *Lycopodium*, *Selaginella*, *Equisetum* and *Marsilea*. Study of temporary, single stained micro-scopic preparation of the following : Cone of *Lycopodium*, *Selaginella* and *Equisetum*. Petiole, Root and Sporocarp of *Marsilea* ; Rhizophore and root of *Selaginella*.

Temporary, double stained microscopic preparations of T.S., T.L.S. and R.L.S. of stem of *Pinus* and *Ephedra* and T.S. Leaflet and Rachis of *Cycas* and needle of *Pinus*, T.S. of normal and coralloid roots of *Cycas*. Microscopic preparations of male cone of *Pinus* and male and female cones of *Ephedra*. Study of male cone and megasporophyll of *Cycas*.

MARKING SCHEME

There shall be a practical examination of five hours duration and the distribution of marks shall be as follows :

S.No	TOPIC	MARKS
1.	A double stained section of plant part either of Pteridophyte or Gymnosperm glycerine mount	
2.	Minor preparation of Pteridophyte or Gymnosperm (not covered in Q.1)	
3.	Preparation and mounting of the part of : a) A Bryophyte b) A Fungus c) An Alga d) Bacteria	
4.	Spots : Seven a) (a) One from each group (Algae, Lichen, Bryophytes, Fungi, Fossil, Pteridophytes, Gymnosperms). b) One microbiological experiment for comments.	
5.	Viva-Voce	
6.	Practical records	
	TOTAL	

BOOKS SUGGESTED

Alexopoulos, C.J.: Introductory Mycology, John Wiley and Sons, N.Y. 1978.

Bendre, A. and Kumar, A.: A Test Book of Practical Botany, Rastogi Publication, Meerut.

Ghemawat, M.S., Kapoor, J.N. and Narayan, H.A.: A Text Book of Algae, Ramesh Book Depot, Jaipur, 1976.

Gupta, M.N.: A Class Book of Gymnosperms, 1978.

Parihar, N.S.: An Introduction to Embryophyta, Vol. I, Pteridophyta, Vol.II, Central Book Depot, Allahabad, 1969.

Sharma, P.D.: Fungi, Rastogi Publications, Meerut, 1989.

Sharma, P.D.: Microbiology and Plant Pathology, Rastogi and Co. Meerut, 1989.

Vashishtha, B.R.: Botany for Degree Students (Algae, Fungi, Bryophyta and Gymnosperms), S. Chand and Co., New Delhi, 1976.

Singhvi, V., Pandey, P.C. and Jain, D.K.: A Text Book of Botany, Rastogi and Co., Meerut.

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MOHANLAL SUKHADIA UNIVERSITY, UDAIPUR

FIRST YEAR B. Sc. MATHEMATICS 2016-17

PAPER-I

ALGEBRA

Duration: 3 Hours

Max. Marks: 50

UNIT-I

Symmetric, Skew Symmetric, Hermitian and skew Hermitian matrices. Linear independence of row and column matrices. Row rank, column rank and rank of a matrix. Equivalence of column and row ranks.

Eigen values, Eigen vectors and characteristic equation of a matrix. Cayley-Hamilton theorem and its use in finding inverse of a matrix. Theorems and examples of consistency of a system of linear equations.

UNIT- II

Relation between the roots and coefficients of general polynomial equation in one variable. Transformation of equations. Descartes's Rule of signs, solution of Cubic equations (Cardan method). Biquadratic equations. Horner's Method, Ferrari's Method.

UNIT-III

Groups and their defining theorems. Various examples, order of an element and related theorems, Permutation Groups, even and odd permutations, cyclic groups, subgroups, union, intersection of two and finite subgroups and various examples, product of two subgroups.

UNIT –IV

Left and right cosets and their properties, Lagrange's theorem, index of a subgroup. Normal subgroups their examples and elementary basic theorems, Quotient group. Simple group, centre of group, Normalizer of an element and that of a subgroup, Conjugacy relation, class equation for finite groups.

UNIT-V

Group homomorphism and isomorphism with elementary basic properties, Cayley's theorem for finite groups, fundamental theorem of homomorphism in groups. The three isomorphism theorems of groups. Automorphisms and inner automorphisms.

References:

1. I. N. Herstein : Topics in Algebra, Wiley Eastern Ltd., New Delhi, 1975.
2. R. S. Agrawal : A Textbook on Modern Algebra.
3. K. B. Datta : Matrix and Linear Algebra Prentice Hall of India Pvt. Ltd., New Delhi, 2000.
4. H. S. Hall and S.R. Knight : Higher Algebra, H.M. Publications, 1994.
5. Bansal, Bhargava, Agrawal : Amurt Beej Ganita.
6. Chandrika Prasad : Text book on Algebra and Theory of Equations, Pothishala Pvt. Ltd, Allahabad.
7. Gokhroo, Saini : Elements of Abstract Algebra
8. Sharma, Purohit : Elements of Abstract Algebra

MOHANLAL SUKHADIA UNIVERSITY, UDAIPUR

FIRST YEAR B. Sc. MATHEMATICS 2016-17

PAPER-II

CALCULUS

Duration: 3 Hours

Max. Marks: 75

UNIT-I

Polar coordinates and derivatives of arc, polar subtangent and subnormal, pedal-equation, Roll's Theorem, Mean Value Theorems, Taylor's Theorem, their proofs, verifications and applications.

UNIT -II

Asymptotes, curvature, Test of concavity and convexity. Points of inflexion. Multiple points. Tracing of curves in Cartesian and polar coordinates.

UNIT – III

Beta Gamma functions and their properties. Quadrature, Rectification.

UNIT - IV

Degree and order of a differential equation. Equations of first order and first degree, Equations in which the variables are separable, Homogeneous equations. Linear equations and equations reducible to the linear form. Exact differential equations.

UNIT - V

First order and higher degree equations solvable for x, y, p . Clairaut's form and singular solutions. Geometrical meaning of a differential equation. Linear differential equations with constant coefficients. Homogeneous linear ordinary differential equations and the equations reducible in homogeneous form.

References:

1. Gorakh Prasad : A Text book on differential calculus (Pothi

shala)

2. Gorakh Prasad : A Text book on Integral calculus and Differential Equations (Pothi shala).
3. E. A. Codignton : An introduction to ordinary Differential Equations Prentice Hall of India, 1961.
4. P.K. Jain and S. K. Kaushik : An Introduction to Real Analysis, S. Chand & Co., New Delhi-11, 2000.
5. Bansal, Bhargava : Avakalan Ganita-II
6. Bansal, Bhargava : Samakalan Ganita-II
7. Gokhroo, Saini : Uchch Avakalan Ganita.
8. Gokhroo, Saini : Uchch Samakalan Ganita.
9. Bansal, Bhargava & Agrawal : Avkal Samikaran I.
10. Gokhroo, Saini, Kumbhat : Avkal Samikaran.

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MOHANLAL SUKHADIA UNIVERSITY, UDAIPUR

FIRST YEAR B. Sc. MATHEMATICS 2016-17

PAPER –III GEOMETRY

Duration: 3 Hours

Max. Marks: 75

UNIT -I

General equation of second degree, nature of conic, eccentricity and foci of conic, Tracing of different conics. Ellipse : Tangent, normal, Chord of contact of the tangents, pole and polar, eccentric angle, auxiliary circle, director circle, equation of chord in term of middle point, pair of tangents, conjugate lines, diameter and conjugate diameters and their properties.

UNIT - II

Hyperbola: Parametric coordinates, tangent, normal, chord of contact of tangents, pole and polar etc. asymptotes, conjugate hyperbola, conjugate diameters, rectangular hyperbola, equation of hyperbola referred to its asymptotes. Polar Equations: Polar equation of conic, polar equations of tangent, perpendicular lines and normal, director circle of the conic.

UNIT-III

Plane and straight line: Equation to represent two planes and angle between them, projection on a plane area of a triangle and volume of tetrahedron. Equations of line intersecting two lines, skew lines, shortest distance between two lines, intersection of three planes and three lines.

UNIT- IV

Sphere: General Equation, Tangent Plane, Pole and Polar, Intersection of two spheres, Radical plane, Radical line, Radical centre, Co-axial spheres, Limiting points.

Cone: Enveloping cone, Tangent plane, Reciprocal cone, Three mutually Perpendicular generators, Right circular cone.

Cylinder: Right circular cylinder, Enveloping cylinder

UNIT-V

General equation of second degree in three dimensions. Intersection of a line and a conicoid. Tangent lines and Tangent plane. Condition of tangency, plane section with a given centre. Diametral plane. Principal planes, principal directions and plane sections.

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1. Gorakh Prasad and H.C. Gupta : A Text book of coordinate Geometry (Pothishala)
2. S.L.Loney : The Elements of coordinate Geometry; Mack-Millan and Company, London.
3. R.J.T. Bell : Elementary Treatise on coordinate Geometry of Three Dimensions.
4. P.K. Jain and Khalil Ahmed : A Textbook of Analytical Geometry of Three Dimensions, Wiley Eastern Ltd., 1999.
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6. Bansal, Bhargava : Dwivim Nirdeshank Jyamiti
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