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**PANDIT DEENDAYAL UPADHYAYA SHEKHAWATI
UNIVERSITY, SIKAR**

SYLLABUS

B.Sc. Part I

SESSION 2022-23

EXAMINATION-2023


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Shekhawati University,
Sikar(Rajasthan)**



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UNIVERSITY, SIKAR**

**BSC PART-I
Session 2022-2023 (Examination-2023)**

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Optional Subjects :-		
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<p>N.B. : 1. Candidates must Pass separately in each of the test/theory and Practical (wherever prescribed)</p> <p>2. Common papers in the subjects of Statistics, Mathematics, Economics, Geography and Psychology will be set both in the Faculties of Social Science and Science. The allocation of marks will however be different as mentioned in the booklet of syllabus.</p>		


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Scheme of Examination

B.Sc. (Pass Course) Part-I

The number of papers and the maximum marks for each paper together with the minimum marks required for a pass are shown in the scheme of examination against each subject separately. It will be necessary for a candidate to pass in the theory part as well as the practical part of a subject/paper. Wherever prescribed separately. Classification of successful candidates shall be as follows :

First Division 60% }
Second Division 48% } of the aggregate marks prescribed at (a) Part first
Examination excluding those obtained in the compulsory
Subject (b) Part Second Examination (c) Part Third
Examination taken together.

All the rest will be declared to have passed the Examination. If they obtain a minimum pass marks in each subject viz 36% No division shall be awarded at the Part First and Part Second Examinations :

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बी.एस.सी. प्रथम वर्ष
सामान्य हिन्दी

पूर्णांक: 100

न्यूनतम उत्तीर्णक: 36

नोट: 36 से कम अंक लाने पर छात्रों को उत्तीर्ण नहीं किया जायेगा। इस प्रश्न-पत्र में प्राप्त अंकों को श्रेणी निर्धारण हेतु नहीं जोड़ा जायेगा।

अंक विभाजन- प्रश्न-पत्र में दो भाग होंगे- 1. साहित्य खण्ड एवं 2. व्याकरण खण्ड। साहित्य खण्ड में दो भाग होंगे- गद्य भाग एवं पद्य भाग। प्रत्येक खण्ड के लिए 50 अंक निर्धारित है।

	50 अंक
क. दो व्याख्या पद्य से (प्रत्येक में विकल्प देना है)	5x2=10
ख. दो व्याख्या गद्य से (प्रत्येक में विकल्प देना है)	5x2=10
ग. आलोचनात्मक प्रश्न पद्य से (प्रत्येक में विकल्प देना है)	7½x2=15
ग. आलोचनात्मक प्रश्न गद्य से (प्रत्येक में विकल्प देना है)	7½x2=15

साहित्य खण्ड - 'क' गद्य+पद्य की निर्धारित रचनाएँ
गद्य भाग-

1. कहानी - नशा - प्रेम चन्द
2. रेखाचित्र - महादेवी वर्मा-घीसा
3. निबंध - सरदार पूर्ण सिंह-आचरण की सभ्यता
4. व्यंग्य- शरद जोशी-मेघदूत की पुस्तक समीक्षा
5. पर्यावरण- अनुपम मिश्र -आज भी खरे हैं तालाब

पद्य भाग:-

1. कबीर- कबीर ग्रंथावली से सं. -गुरुदेव को अंग -2,12,26,30
सुमिरन को अंग- 10,17,24,26
विरह को अंग - 2,6,10,18
2. तुलसीदास - विनय पत्रिका, गीता प्रेस, गोरखपुर पद सं.
पद सं. -87,88,105,111,162
3. रहीम (दस दोहे)- रहीम ग्रंथावली, संपादक विद्यानिवास मिश्र, गोविन्द
रजनीश
38,49,87,126,187,212,218,220,222 एवं 224
4. मैथिलीशरण गुप्त- मनुष्यता, हम राज्य के लिए मरते हैं (गीत, साकेत के नवम सर्ग
से)
5. सुमित्रानन्दन पंत- नौका विहार
6. सूर्यकान्त त्रिपाठी 'निराला' वह तोड़ती पत्थर

उप कुलसचिव
पंडित दीनदयाल उपाध्याय शैखावाटी
दिव्यविद्यालय, सीकर (राज.)

7. सच्चिदानंद हीरानंद वात्स्यायन 'अज्ञेय' – हिरोशिमा
 8. रामधारी सिंह दिनकर— विपथगा, समर शेष है

खण्ड— ख

व्याकरण/व्यावहारिक हिन्दी खण्ड

50 अंक

- | | | |
|---------------------------------|---|-------|
| 1. निबंध लेखन | —शब्द सीमा 300 शब्द | 8 अंक |
| 2. कार्यालयी लेखन | —शासकीय—अर्द्धशासकीय पत्र, कार्यालय ज्ञापन, विज्ञप्ति एवं कार्यालय आदेश, अधिसूचना, पृष्ठांकन 4X2= | 8 अंक |
| 3. संक्षेपण | — | 4 अंक |
| 4. पल्लवन | — | 5 अंक |
| 5. शब्द निर्माण प्रविधि | —उपसर्ग, प्रत्यय, संधि एवं समास | 5 अंक |
| 6. शब्द शुद्धि एवं वाक्य शुद्धि | — | 5 अंक |
| 7. मुहावरे एवं लोकोक्ति | — | 5 अंक |
| 8. पारिभाषिक शब्दावली — | — | 5 अंक |
| 9. शब्द के प्रकार | —संज्ञा, सर्वनाम, विशेषण, क्रिया एवं क्रिया विशेषण | 5 अंक |

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 पंडित दीनदयाल उपाध्याय शंखावाटी
 विश्वविद्यालय, सीकर (राज.)



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**PANDIT DEENDAYAL UPADHYAYA SHEKHAWATI
UNIVERSITY, SIKAR**

B.Sc. Part -I

GENERAL ENGLISH

Duration: 3 hrs.

Max. Marks: 100

Minimum Pass Marks: 36

The syllabus aims at achieving the following objectives:-

1. Introducing students to phonetics and enabling them to consult dictionaries for correct pronunciation (sounds and word stress.)
2. Reinforcing selected components of grammar and usage.
3. Strengthening comprehension of poetry, prose and short-stories
4. Strengthening compositional skills in English for paragraph writing. CVs and job applications.

The Pattern of the Question Paper will be as follows:

Unit A: Phonetics and Translation	(20 Marks)	(10 periods)
I Phonetic Symbols and Transcription of Words		(05)
III Translation of 05 Simple sentences from Hindi to English		(05)
from English to Hindi		(05)
IV Translation of 05 Words from Hindi to English		(2 1/2)
from English to Hindi		(2 1/2)
Unit B: Grammar and Usage	(25 Marks)	(10 Periods)
I Elements of a sentences		(05)
II Transformation of Sentences		(05)
a. Direct and Indirect Narration		
b. Active and passive Voice		

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III Modals	(05)
IV Tense	(05)
V Punctuation of a Short Passage with 10 Punctuation Marks (As discussed in Quirk and Greenbaum)	(05)

Unit C: Comprehension**(25 Marks)**

Following Essays and Stories in Essential Languages Skill revised edition compiled by Macmillan for Pandit Deendayal Upadhyaya Shekhawati University Sikar, Rajasthan General English B.Com.

Candidates will be required to answer 5 Questions out of ten questions from the prescribed texts. Each question will be of two (2) marks. (10)

Sujata Bhatt	Voice of the Unwanted Girl
Ruskin Bond	Night Train for Deoli
M.K. Gandhi	The Birth of Khadi
J.L. Nehru	A Tryst with Destiny
A.P.J. Abdul Kalam	Vision for 2020

The Candidate will be required to answer 5 questions from an unseen passage. (10 Marks)

One Vocabulary question of 10 words from the given passage. (5 Marks)

Unit D: Compositional Skills**(30 Marks) (15 periods)**

I Letters-Formal and Informal	(10 Marks)
II CV's Resume and Job Applications and Report	(10 Marks)
III Paragraph Writing	(10 Marks)

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B .Sc. PART –I

COMPULSORY PAPER OF ENVIRONMENTAL STUDIES

Scheme of examination

Duration: 3 hrs.

Min Marks: 36

Max. Marks: 100

This paper will contain 100 multiple questions. Each question will carry 1 mark.

Student should be encouraged to visit places of Environmental Importance including Natural and Manmade Habitat.

Note:

1. The marks secured in this paper shall not be counted in awarding the division to a candidate.
2. The candidates will have to clear this compulsory paper in three chances.
3. Non-appearing or absence in the examination of compulsory paper will be counted as a chance.

Unit I: The Multidisciplinary nature of environmental studies

Definition, scope and importance- Relationship between Environmental Studies and other branches of science and social sciences.

Need for Environmental awareness, Environmental education in present day context.

Unit.2: Natural Resources and Challenges

- a. Natural resources and associated problems, Classification of resources: renewable resources, non renewable resources, classes of earth resources, regions: Definition and criteria, resource conservation.
- b. Forest resources: Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forest and tribal people.
- c. Water resources: Use and over-utilization of surface and groundwater, floods, drought conflicts over water, dams-benefits and problem.
- d. Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.
- e. Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticides problems, water logging, salinity, case studies.

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- f. Energy resources: Growing energy need, renewable and nonrenewable energy sources, use of alternate energy source. Case studies.
- g. 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.

Unit 3: Ecosystems, Concepts, Structure, Functions and Types

- 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 characteristics features, structure and function of the following ecosystem:
 - a. Forest ecosystem, Tropical Temperate and Alpine Ecosystem
 - b. Grassland ecosystem and Their Types
 - c. Desert ecosystem with emphasis on Thar Desert
 - d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries) and Wet Lands

Unit 4: Biodiversity 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 level
- Indian as a mega-diversity nation
- Hot-spot of biodiversity
- Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts
- Endangered, Threatened and endemic species of India
- Conservation of biodiversity: In-situ and ex-situ conservation of biodiversity
- Red Data Book

Unit 5: Environmental Pollution and Control Measures

Definition

- Causes, effects and control measures of:
 - (a) Air Pollution
 - (b) Water Pollution
 - (c) Soil Pollution
 - (d) Marine Pollution

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- (e) Noise Pollution
- (f) Thermal Pollution
- (g) Nuclear Hazards
 - Solid waste management” Causes, effects and control measure of urban and industrial wastes
 - Role of an individual in prevention of pollution
 - Pollution case studies
 - Disaster management: floods, earthquake, cyclone and landslides

Unit 6: Social issues, Environment, Laws and Sustainability

- From Unsustainable to Sustainable development
- Urban problems related to energy
- Water conservation, rain water harvesting, watershed management
- Resettlement and rehabilitation of people; its problems and concerns. Case studies
- Environmental ethics: Issues and possible solution.
- Climate change, global warming, acid rain ozone layer depletion, nuclear accidents and holocaust. Case studies'
- Wasteland reclamation.
- Consumerism and waste product.
- Environmental Protection Act.
- Air (Prevention and Control of Pollution) Act
- Wild life protection Act
- Forest Conservation Act
- Biological Diversity Act
- Issues involved in enforcement of environmental legislation
- Public Awareness.

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

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B.Sc. Part-I

Elementary Computer Application

Duration: 2 hrs.

Maximum Marks - 100

Theory Max. Marks -60

Practical Max Marks -40

Each Candidate has to pass in Theory and Practical Examinations separately. Question paper for Elementary Computer Applications, (Compulsory paper common for B.A./B.Sc./ B.Com. Part-I) be so set that it has 120 multiple choice questions (Bilingual) of 0.5 marks each. The question paper will be of duration of 2 hours. The examinees will have to give their answers on OMR Sheet only to be provided by the University whose evaluation will be done based on OMR Scanning Technology. Further the practical examination for this paper will be of 40 marks and its duration will be of 2 hours.

Unit-I

Introduction to information technology: Evolution and generation of computer, type of computers, micro, mini, mainframe and super computer. Architecture of a computer system: CPU, ALU, Memory (Ram, Rom families) cache memory, input /output devices, pointing devices. Concept of Operating system, need types of operating systems, batch, single user, multi-processing, distributed and timeshared operating systems, introduction of Unix, Linux, Windows, Window NT. Programming languages Low level and high level languages, generation of languages, 3 GL and 4 GL languages, Graphic User Interfaces.

Unit -II

Word Processing tool: Introduction, Creating, Saving, Copy, Move and Delete Checking Spelling and Grammar. Page Layout, interface, toolbars, ruler, menus keyboard shortcut, editing. Text formatting, insert headers and footers, Bullets and Numbering, Find and Replace etc. Insert Table and Picture, Macro, Mail Merge.

Power Point: Creating and viewing a presentation, managing slide shows navigating through a presentation using hyperlinks, advanced navigation with action setting and action buttons. Organizing formats with Master slides applying and modifying designs adding graphics, multimedia and special effects.


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Unit - III

Electronic Spreadsheet : Worksheet types of create and open a worksheet Entering data text numbers and formula in a worksheet inserting and deleting cells, cell formatting, inserting rows and columns in a worksheet formatting worksheets Using various formula and inbuilt function. Update worksheet using special tools like spell check and auto correct setup the page and margins of worksheets for printing. Format the data in the worksheet globally or selectively creating charts. Enhance worksheets using charts, multiple worksheets-concepts

Unit - IV

The Internet - History and Functions of the Internet, Working with Internet, Web Browsers, World Wide Web, Uniform Resource Locator and Domain Names, Uses of Internet, Search for Information, Email Chatting, Instant messenger services, News, Group, Teleconferencing. Video Conferencing, E-Commerce and M-Commerce, Manage an E-mail Account, E-mail Address configure E-mail Account log to an E-mail, Receive E-mail, Sending mails, sending files an attachments and Address Book, Downloading Files, online form filling, E-Services E-Banking and E-Learning.

Unit - V

Social, Ethical and Legal Matters - Effects on the way we Work Socialise, Operate in other areas, Cyber crime, Prevention of crime, Cyber law Indian IT Act, Intellectual property, Software piracy, Copyright and Patent, Software licensing, Proprietary software, Free and Open source software.

Network Security - Risk assessment and security measures, Assets and types (data, applications, system and network), Security threats and attacks (passive, active), types and effects (e.g. Identity theft, denial of services, computer virus etc), Security issues and security measures (Firewalls, encryption/decryption), Prevention.

Question Paper pattern for Main University Practical Examination

Practical

Max Marks: 40

The practical exercises will be designed to help in the understanding of concepts of computer and the utilization in the areas outlined in the theory syllabus. The emphasis should be on practical usage rather than on theoretical concepts only.

The practical examination scheme should be as follows

- Three Practical Exercise (including Attendance & Record performance) **30 marks**
 1. Operating system o MS Word
 2. MS Excel
 3. MS Power Point
 4. Internet
- Viva-voce **10 marks**


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B.Sc. Part I CHEMISTRY

Scheme:

Max. Marks: 150

	Duration (hrs.)	Max Marks	Min. Pass Marks
Paper I	3	33	36
Paper II	3	33	
Paper III	3	34	
Practical	5	50	18

Note: - Ten (10) questions are to be set taking two (02) questions from each unit. Candidates have to answer any 5 questions selecting at least one question from each unit.

CH-101 Paper I : Inorganic Chemistry
(2hrs or 3 periods/ week)

UNIT-I

Ionic Solids: Ionic structures , radius ratio effect and coordination number, limitation of radius ratio rule, lattice defects, semiconductors, lattice energy and Born Haber cycle, salvation energy and solubility of ionic solids , polarizing power and polarisability of ions, Fajan's rule

Metallic bond: free electron, valence bond and band theories.

Weak Interactions: Hydrogen bonding, vander Waals forces.

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UNIT-II

Covalent Bond: Valence bond theory and its limitations, directional and shapes of simple inorganic molecules and ions. Valence shell electron pair repulsion (VSEPR) theory to NH_3 , H_3O^+ , SF_4 , ClF_3 , ICl_2 , H_2O .

Molecular Orbital theory: homonuclear and heteronuclear (CO and NO) diatomic molecules. Multicenter bonding in electron deficient molecules, bond strength and bond energy, percentage ionic character from dipole moment and electro negativity difference.

UNIT-III

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

Periodicity of p-block elements: Periodicity in properties of p-block elements with special reference to atomic and ionic radii, ionization energy, electron affinity, electronegativity, diagonal relationship, catenation.

UNIT-IV

Some important compounds of p-block Elements: Hydrides of boron, diborane, borazine, carbides, fluorocarbons, silicates (structural principle). Basic properties of halogens, interhalogens.

Chemistry of noble of Gases: Chemical properties of the noble gases. Chemistry of Xenon, structure and bonding in Xenon compounds.

UNIT-V

Nuclear Chemistry: Fundamental particles of nucleus (nucleons) ; Concept of nuclides and its representation : Isotopes, Isobars and Isotones (with specific examples); Forces operating between nucleons (n-n ,p-p&n.p.); Qualitative idea of stability of nucleus (n/p ratio).

Radiochemistry: Natural and artificial radioactivity, Radioactive disintegration series; Radioactive displacement law; Radioactivity decay rates; Half life and average life; Nuclear binding energy, mass defect and calculation of defect and binding energy; Nuclear reactions, Spallation, Nuclear fission and fusion.

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CH-102 Paper II: Organic Chemistry

(2 hrs or 3 periods/ week)

UNIT-I

Mechanism of Organic Reactions: Homolytic and heterolytic bond cleavage. Types of reagents, electrophiles and nucleophiles. Reactive intermediates-carbocations, carbanions, free radicals carbenes, arynes and nitrenes (with examples). Types of organic reactions, energy considerations. 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, difference between configuration and conformation, Flying wedge and Fischer projection formulae.

Optical Isomerism: Elements of symmetry, molecular chirality, enantiomers, stereogenic centre, optical activity. Properties of enantiomers, chiral and achiral molecules with two stereogenic centres. Diastereomers, threo and erythro isomers, meso compounds. Resolution of enantiomers. Inversion, retention and racemization (with examples).

Relative and absolute configuration, sequence rules D/L and R/S systems of nomenclature.

Geometric Isomerism: Determination of configuration of geometric isomers – cis/ trans and E/Z systems of nomenclature. Geometric isomerism in oximes and alicyclic compounds.

Conformational Isomerism: Newman projection and Sawhorse formulae, Conformational analysis of ethane, n-butane, cyclohexane.

UNIT-III

Cycloalkanes: Nomenclature, method of formation, chemical reactions. Baeyer's strain theory and its limitations. Theory of strainless rings.

Dienes: Classification and nomenclature of isolated, conjugated and cumulated dienes. Structure of allenes and butadiene. Methods of formation, properties, Chemical reactions- 1,2 and 1,4 additions, Diels-Alder reaction and polymerization.

Alkynes: Structure and bonding in alkynes. Methods of formation. Chemical reactions- acidity of alkynes; mechanism of electrophilic and nucleophilic addition reactions; hydroboration-oxidation, metal ammonia reduction, oxidation and polymerization.

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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, MO diagram.

Aromaticity: the Huckel rule, aromatic ions- three to eight membered .

Aromatic electrophilic substitution: General pattern of the mechanism, role of sigma and pi complexes. Mechanism of nitration, halogenation, sulphonation, mercuration, Friedel Crafts reactions and chloromethylation. Energy profile diagrams. Activating and deactivating substituents. Directive influence – orientation and orth/para ratio. Side chain reactions of benzene derivatives . Birch reduction.

UNIT-V

Alkyl and Aryl Halides: Methods of formation of alkyl halides, chemical reactions. Mechanisms of nucleophilic substitution reactions of alkyl halides S_N2 and S_N1 reactions with energy profile diagrams.

Polyhalogen compounds: Chloroform, carbon tetrachloride.

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

Relative reactivities of alkyl, allyl, vinyl and aryl halides.

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CH-103 Paper III: Physical Chemistry

(2 hrs or 3 periods/ week)

UNIT-I

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

Liquid State: intermolecular forces, structure of liquids (a qualitative description), Structural difference between solids, liquids and gases. Liquid crystals: Difference between liquid crystal, solid and liquid. Classification, structure of nematic and cholestric phases. Thermography and seven segment cell.

UNIT-II

Gaseous State: Postulates of kinetic theory of gases, deviation from ideal behaviour, van der Waals equation of state.

Critical Phenomenon: 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. Liquification of gases (based on Joule-Thomson effect).

UNIT-III

Solid State: Definition of space lattice, unit cell.

Laws of crystallography (i) Law of constancy of interfacial angles (ii) Law of rationality of Indices (iii) Law of symmetry. Symmetry elements in crystals.

Basic concept of X-ray diffraction by crystals. Derivation of Bragg's equation Determination of Crystal structure of NaCl and CsCl (Laue's method and powder method), band theory of solids. Defect in solids.

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UNIT-IV

Colloidal State: Definition of colloids, classification of colloids.

Solids in liquids (sols) : properties- kinetic , optical and electrical, stability of colloids, protective action. Hardy-Schulze law, gold number.

Liquids in solids (gels) : classification, preparation and properties, inhibition, general applications of colloids.

Liquids in liquids (emulsions): types of emulsions, preparation. Emulsifier.

UNIT-V

Chemical Kinetics: Chemical kinetics and its scope, rate of a reaction, factors influencing the rate of a reaction, concentration, temperature, pressure, solvent, light, catalyst. Concentration dependence of rates, mathematical characteristics of simple chemical reactions- zero order, first order, second order, pseudo order, half-life and mean-life. Determination of the order of reactions-differential method, method of integration, method of half-life period and isolation method.

Radioactive decay as a first order phenomenon.

Experimental methods of chemical kinetics: conductometric, potentiometric, optical methods, polarimetry and spectrophotometry. Theories of chemical kinetics. Effect of temperature on rate of reaction, Arrhenius equation, concept of activation energy.

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Practical: CH-104 Laboratory Course-I

(4 hrs or 6 hrs periods/week)

INORGANIC CHEMISTRY

Separation and identification of six radicals (3 cations and 3 anions) in the given inorganic mixture including special combinations.

ORGANIC CHEMISTRY

Laboratory Techniques

- Determination of melting point (naphthalene, benzoic acid, urea, etc.) boiling point (methanol, ethanol cyclohexane, etc.) mixed melting point (urea-cinnamic acid, etc)
- Crystallization of phthalic acid and benzoic acid from hot water, acetanilide from boiling water, naphthalene from ethanol etc; Sublimation of naphthalene, camphor, etc.

Qualitative Analysis

Element Detection (N.S. and halogens). Functional group determination (unsaturation, phenolic, alcoholic, carboxylic, carbonyl, ester, carbohydrate, amine, amide, nitro) in simple organic solids and liquids.

PHYSICAL CHEMISTRY

(One of the following experiments should be given in the examination)

(i) Chemical Kinetics:

- To determine the specific reaction rate of the hydrolysis of methyl acetate / ethyl acetate catalyzed by hydrogen ions at room temperature.
- To study the effect of acid strength on the hydrolysis of an ester.
- To compare the strengths of HCl and H₂SO₄ by studying the kinetics of hydrolysis of ethyl acetate.
- To study kinetically the reaction rate of decomposition of iodide by H₂O₂.

(ii) Viscosity, Surface Tension:

- To determine the viscosity/surface tension of a pure liquid (alcohol etc.) at room temperature. (using the Ostwald viscometer/stalagmometer).
- To determine the percentage the percentage composition of a given binary mixture by surface tension method (acetone & ethyl methyl ketone).
- To determine the percentage composition of a given mixture (non-interacting systems) to viscosity method.
- To determine the viscosity of amyl alcohol in water at different concentration and calculate the excess viscosity of these solutions.

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Instructions to the Examiners

CHY 104: Chemistry Practical (Pass course)

Max. Marks: 50

Duration of Exam: 5 hrs.

Minimum Pass marks: 18

Inorganic Chemistry

Ex. I Separation and identification of 3 cations and 3 anions in the mixture 15

Organic Chemistry

Ex. 2 Laboratory Technique 3

Ex. 3 Qualitative Analysis

Detection of element and detection of functional group 10

Physical Chemistry

Ex. 4 Perform one of the experiments mentioned in the syllabus 12

Ex. 5 Viva-voce 5

Ex. 6 Record 5

Total 50

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**PANDIT DEENDAYAL UPADHYAYA SHEKHAWATI
UNIVERSITY, SIKAR**

SYLLABUS FOR THE SESSION 2022-2023 (MAIN EXAMINATION-2023)

ZOOLOGY

B.Sc. Part-I

Max. Marks: 100		Min. Pass Marks: 36
Paper I	: 3 Hrs. duration	33 Marks
Paper I	: 3 Hrs. duration	33 Marks
Paper I	: 3 Hrs. duration	34 Marks
Practical	: 4 Hrs. duration	50 Marks

Note:-

1. There will be two parts of every theory question paper with a total duration of 3 hours. First part of question paper will comprise of question No. 1 containing 8(Paper I & II) or 9 (Paper III) concise answer (Maximum 25 words) type question each of 1 marks. This part is compulsory to attempt, Questions should be evenly distributed covering the entire syllabus.
The Second part of question paper will be of long answer type questions with five units. There will be total 10 questions in this part, i.e., two from each unit, out of which candidate will be required to attempt one question from each unit. Each question will carry 5 marks.
2. The candidate has to answer all questions in the main answer book only.

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DIVERSITY OF ANIMALS

UNIT-I

Biosystematics and Taxonomy

1. General principles of taxonomy, concept of five kingdom schemes, international code of nomenclature, cladistics, molecular taxonomy.
2. Concept of Protozoa and Metazoan, and levels of organization.
3. Taxonomy and basic of classification of non-chordata and chordate: symmetry, coelom, segmentation and embryogeny

UNIT-2

1. . Detailed classification of Non-chordata and Chordata (up to suborders with examples)
2. Protozoan: Ameoba, Entamoeba, Paramecium, Euglena, Plasmodium, Trypanosoma and Leishmania.

UNIT-3

1. Porifera: Leucosolenia & Syon
2. Colentrata: Obelia & Aurelia.

UNIT-4

1. Ctenophora: Beroe
2. Platyhelminthes: Fasciola hepatica and Taenia solium.

UNIT-5

1. Aschelminthes: Ascaris, plant nematode (Heterodera) wuchereria.
2. Annelida: Neries and Leech.

Note:- (For unit 3,4,5)

Habit, Habitat, Morphology structure, locomotion, organs & systems(Digestive, Excretory, Respiratory, Osmoregulation, Nervous & reproductive) life cycle, affinities & adaptations.


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UNIT- I

1. Introduction to cell: Morphology, size, shape, characteristics and structure of prokaryotic and eukaryotic animal's cell; basic idea of virus and cell theory.
2. Cell membrane: Characteristics of cell membrane and its molecules, fluid-mosaic models of cell membranes of Singer and Nicholson, concept of unit membrane.
3. Cell membrane transport: transport: Passive (diffusion and osmosis, facilitated, mediated) and active transport.
4. Cytoplasmic organelles.

UNIT-II

1. Structure and biogenesis of mitochondria; electron transport chain and generation of ATP molecules.
2. Structure and functions of endoplasmic reticulum, ribosome (prokaryotic and eukaryotic) and Golgi complex.
3. Structure and function of lysosome , micro bodies and centrioles.
4. Structure and functions of cilia, flagella microvilli and cytoskeletal elements.

UNIT-III

1. Nuclear Organization:
 - (i) Structure and function of nuclear envelope, nuclear matrix and nucleolus.
 - (ii) Chromosomes: Morphology, chromonema, chromomeres, telomeres, primary and secondary constrictions, chromatids, prokaryotic chromosome.
 - (iii) Giant chromosome types: Polytene and Lampbrush.
 - (iv) Chromosomal organization: Euchromatin, heterochromatin and folded fiber model and nucleosome concept.
2. Nucleic Acids:
 - (i) DNA structure, polymorphism (A,B and Z,types) and replication (semi conservative mechanism), experiments of Messelson and Stanl: elementary idea about polymerases, topoisomerases , single strand binding proteins, replication forks (both unidirectional and bidirectional), leading and lagging strands, RNA primers and Okazaki fragments, elementary idea about DNA repair.
 - (ii) RNA structure and types (mRNA,rRNA and tRNA) and transcription.


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3. Genetic code and translation: Triplet code, characteristics of triplet code, protein synthesis (translation).

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UNIT-4

1. Cell in reproduction:
 - (i) Interphase nucleus and cell cycles: S, G-1, G-2 and M phase.
 - (ii) Mitosis: Different stages, structure and function of spindle apparatus: anaphasic movement.
 - (iii) Meiosis: Different stages, synapses and synapses and synaptonemal complex, formation of chiasmata and significance of crossing over.

UNIT-5

Genetics

1. Mendelism: Brief history of genetics and Mendel's work; Mendelian laws, their significance and current status, chromosomal theory of inheritance Exceptions of mendelian laws.
2. Chromosomal mutations: Classification, translocation, inversion, deletion and duplication; Variations in chromosome numbers; haploidy, polyploidy, aneuploidy, euploidy and polysomy.
3. Linkage and crossing over, elementary idea of chromosome mapping.
4. Genetic interaction: Gene interaction Supplementary genes, complementary genes, duplicate genes, epistasis, inhibitory and polymorphic genes.
5. Multiple gene inheritance: ABO blood groups and Rh factor and their significance.
6. Cytoplasmic inheritance.
7. Sex determination in Drosophila and man, pedigree analysis.
8. Genetic disorders: Down's, Turner's and Klinefelter's syndromes, color blindness, Hemophilia Phenylketonuria.
9. Concept of gene: Recon, Muton and cistron.


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PAPER- III: Z-103
DEVELOPMENTAL BIOLOGY
UNIT- I

Developmental Biology: Scope and Early Events

1. Historical review, types and scope of embryology.
2. Gametogenesis:
3. Formation of ova and sperm
4. Vitellogenesis.
5. Fertilization: Activation of ovum, essence of activation: Changes in organization of egg cytoplasm

UNIT-II

Developmental Biology: Pattern and Processes

1. Cleavage: Definition, planes and pattern of cleavage among non chordates and chordates, significance of cleavage, blastulation and morulation.
2. Fate maps, morphogenetic cell movements, significance or gastrulation.
3. Embryonic induction, primary organizer. Differentiation and competence.

UNIT-3

1. Development of chick up to 96 hours stage.
2. Embryonic adaptations.
3. Extra embryonic membranes in chick, their development and functions.
4. Placentation in mammals: Definition, types, classification on the basis of morphology and histology, functions of placenta.
5. Paedogenesis is and neoteny.

UNIT-4

1. Dimensions in Developmental Biology
2. Parthenogenests
3. Regeneration.
4. Various types of stem cells and their applications.

UNIT-5

1. Cloning of animals:
 - a. Nuclear transfer technique.
 - b. Embryo transfer technique.
- 2 Teragenesis (Genetic and Induced)
3. Biology of aging.
4. Cell death.

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**B.Sc. Part-I 2020
Practical – Zoology**

Min. Marks: 18

4 Hrs. /Week

Max. Marks: 50

1. Microscope Techniques:

1. Organization and working of Optical Microscopes: Dissecting and compound microscopes.

2. General method of microscopic slide preparations: Narcotization; fixing and preservation; washing; staining; destaining; dehydration; clearing and mounting.

3. General idea of composition, and use of:

(i) Fixatives Formalin, Bouin’s fluid.

(ii) Stains: Aceto –carmine, Aceto-orcein, Haematoxylin, Eosin.

(i) Common reagents: Normal saline, Acid water, Acid alcohol and Mayer’s albumi.

4 Collections and Culture Methods:

(i) Collection of animals from their natural habits during field trips such as amoeba, Paramecium, Euglena, Cyclops, etc.

(ii) Culture of Paramecium in the laboratory and study of its structure, life-processes and behavior in live state.

II. Study of Microscopic Slides and Museum Specimens:

Protozoa: Amoeba, Euglena, trypanosoma, Giardia, Entamoeba, Elphidium (Polystomella) Foraminiferous shells, Monocystis, Plasmodium, paramecium, leishmania, Paramecium showing binary fission and conjugation, Opalina, Nyctotherus, Balantidium, Vorticella.

Porifera: Leucosolenia, Euplectall, Spongilla, T.S. Sycon, Spicules, Spongin fibers, Gemmules.

Cocenterata: Millepora, Physalia, Velella, Aurelia, Alcyonium, Gorgonia, pennatulala, Sea anemone, Stone corals, Obelia colony and medusa.

Ctenophora: Any Ctenophore

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Platyhelminthes: Taenia, planaria, Fasciola (MW) T.S body of Fasciola, Miracidium , Sporocyst, Redia and Cercaria Larvae of Fasciola, Scolex, T. S. mature proloctid of Taenia, gravid proloctid, Cysticercus larva,

Aschelminthes: Ascaris, Wuchereria, Dracunculus

Annelida : Neries, Heteroneries, Arenicola, Aphrodite, Charetopterus, Tubifix, Glossiphonia, Pontobdella, Polygordius.

III Anatomy:

1. Earthworm: External features, general viscera, alimentary canal, reproductive system and nervous system.

2. Leech: External features, alimentary canal, reproductive and nervous system.

IV Study of the Following Through Permanent Slide Preparation:

1. Paramecium, Egulena. Foraminiferous shells, Sponge spicules, Spongin fibres, gEmmule, Hydra, Obelia colony and Dedusa, Parapodium of Nereis and Heteronereis.

V. Exercises in Cell Biology:

1. Squash preparation for the study of mitosis in onion root tip, permanent slides of mitosis (all stages).
2. Squash preparation for the study of meiosis in grasshopper or cockroach testes, permanent slice of meiosis (all stages)
3. Study of giant chromosomes in salivary glands of Chironomous or Drosophilia larva.
4. Study of cell permeability using mammalian R.B.C.

VI. Exercise in Genetics:

1. Study of Drosophila
 - a. Life Cycle and an idea about its culture.
 - b. Identification of male and female
 - c. Identification of wild and mutants (yellow body, ebony, vestigial wing and white eye
2. Study of permanent prepared slides: Sex comb and salivary gland chromosomes.
 - a. Numerical problems based on monohybrid and dihybrid coss.
 - b. Identification of blood groups (A,B, AB, O & Rh factor)

VI. Developmental Biology:

1. Eggs, cleavage, blastula, gastrula, neurula, tail-bud, hatching, mature tadpole larvae, metamorphic stags, toadlet/froglet.

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2. Histological slides: Cleavage, blastula, gastrula, neurula and tail-bud stage.

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3. Study of development of chick with the help of whole mounts/Charts /Slides /Models

- (i) 18 hrs, 21 hrs, 33 hrs, 48 hrs, 72 hrs, and 96 hrs of incubation.
- (ii) Primitive streak stage in living embryo , if possible, after removal of the blastoderm from the eggs
- (iii) Study of the embryo at various stages of incubation in vivo by making a window in the ege-shell may also be demonstrated.
- (iv) Study of various foetal membranes in a 10-12 day old chick embryo.

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Scheme of Practical examination and Distribution of Marks

Time: 4 Hrs.

Min Pass Marks: 18

Max. Marks: 50

	Regular	Ex./N.C. Students
1. Anatomy (any system)	6	5
2. Permanent Preparation	4	7
3. Cell Biology and Genetis	4+4	6+6
4. Development Biology	6	5
5. Identification and comments on Sport (1 to 8)	16	16
6. Viva Vocc	5	5
7. Class Record	5	
	50	50

Note:-

1. Anatomy Study of systems of the prescribed types with the help of dissection.
2. With reference of microscopic slides, in case of non-availability, the exercise should be substituted with diagrams/ photographs.
3. Candidate must keep a record of all work done in the practical class and submit the same for inspection at the time of practical examination.
4. The candidate must be asked to write detailed methodology wherever necessary and separate marks may be allocated for the same.
5. Mounting material for permanent preparations would be as per the syllabus or as available through collection and culture methods.
6. It should be ensured that animals use in the practical exercises are not covered under the wild life act 1972 and amendments made subsequently.

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BOTANY
B.Sc. Part I (Pass Course Syllabus)

Scheme		
Min. Pass Marks: 36		Max Marks: 100
Paper I	3 hrs. Duration	Max. Marks 33
Paper II	3 hrs. Duration	Max. Marks 33
Paper III	3 hrs. Duration	Max. Marks 34
Practical Min.Marks: 18	4 hrs, duration	Max. Marks 50
Duration of examination of each theory paper-		3 hours
Duration of examination of practicals-		4 hours

Note:

1. There will be 5 questions in each paper. All questions are compulsory. Candidate has to answer all questions in the main answer book only.
2. Q.No. 1 will have 18 very short answer type Questions (not more than 20 words) of half marks each covering entire syllabus.
3. Each paper is divided into four units. There will be one question from each unit. These Q.No. 2 to 5 will have internal choice.

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BOTANY-Paper-I
Cell Biology, Genetics and Plant Breeding
(2 hrs/week)
UNIT-I

Cell organelles and Nuclear material: Ultrastructures and functions of different cell organelles (cell wall, plasma membrane, nucleus, mitochondria, chloroplast, ribosome, peroxisomes, lysosomes, Golgi bodies and Endoplasmic Reticulum). Chromatin structure & Chromosome organization: eukaryotic and prokaryotic. Chromosome morphology; specialized types of chromosomes (Sex chromosomes, lampbrush Chromosome, Polytene chromosome); transposons.

Unit-2

Cell divisions: Cell cycle, mitosis: stages, structure and functions of spindle apparatus; anaphasic chromosome movement; Meiosis: its different stages- Meiosis I, Meiosis II, synaptonemal complex, chiasmata formation and crossing over.

Basis of genetic material: Griffith's transformation experiment and The Hershey and Chase blender experiment to demonstrate DNA as the genetic material. **Concept of Gene:** Neurospora genetics: one gene one enzyme hypothesis; An idea about Prokaryotic and eukaryotic structure of gene – operon concept, exons and introns.

Extra nuclear genome: Mitochondrial and Chloroplast genome, plasmids;
Chromosomal aberrations: Deletion, duplication, translocation, inversion, Aneuploidy and Polyploidy.

Unit-3

Genetic inheritance: Mendel's laws of inheritance and their exceptions; allelic (incomplete and co-dominance, lethality) and non-allelic interactions (complementary genes, epistasis and duplicate genes). Quantitative inheritance : grain color in wheat, corolla length in Nicotiana tabacum.

Unit-4

Plant Breeding : Introduction and objectives of plant breeding; general methods of plant breeding- in self-pollinated, cross-pollinated and vegetatively propagated crop plants : Introduction and acclimatization, selections, hybridizations, hybrid vigour and inbreeding depression. Role of mutation and polyploidy in plant breeding. Famous Indian and international plant breeders and their contribution. National and International agricultural research institutes.

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Plant breeding work done on wheat and rice in India, Green revolution

Suggested Laboratory Exercises:

- Study of cell structure from Onion, Hydrilla and Spirogyra.
- Study of cyclosis in Tradescantia spp.
- Study of plastid for pigment distribution in Lycopersicom, Cassia and Capsicum.
- Study of electron microphotographs of eukaryotic cells for various cell organelles.
- Study of electron microphotographs of virus, bacteria and eukaryotic cell for comparative study of cellular organization.
- Study of different stages of mitosis and meiosis in root-tip cells and flower buds respectively of onion.
- To solve genetic problems based upon Mendel’s laws of inheritance: Monohybrid, Dihybrid, Back cross and test cross.
- Permanent slides/photographs of different stages of mitosis and meiosis, sex chromosomes, polytene chromosome and salivary gland chromosomes,
- Emasculation, bagging & tagging techniques
- Cross pollination techniques

Suggested Readings:

- Choudhary, H.K. (1989). Elementary Principles of Plant Breeding. Oxford and IBM Publishing Co., New Delhi.
- Gupta, P.K. (2009). Cytology, Genetics, Evolution. And Plant Breeding, Rastogi Publications, Meerut.
- Miglani, GS. (2000). Advanced Genetics, Narosa Publishing House, New Delhi.
- Russel, PI. (1998). Genetics. The Benejamins/Cummings Publishikng Co., Inc. U.S.A.
- Shukla, R.S. and Chandel, P.S. (2000). Cytogenetics, Evolution and Plant Breeding, S.Chand & Co. Ltd., New Delhi.
- Singh, R.B. (1999). Text Book of Plant Breeding, Kalyani Publishers, Ludhiana.
- Dnyansagar, VR. (1986). Cytology and Genetics, Tata McGraw-Hill Pub.Co.Ltd. New Delhi.
- Roy, SC. and De, KK. (1999). Cell Biology, New Central Book Agency (P) Ltd. Calcutta.
- Verma, PS. and Agarwal, VK. (2012). Cell Biology, Genetics, Molecular Biology, Evolution and Ecology. S. Chand and Co. Ltd. New Delhi.

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BOTANY-Paper-II
Microbiology, Mycology and Plant Pathology
(2 hrs/week)

UNIT-1

Microbiology: Meaning and Scope, history and development in the field of microbiology. Concept of quorum sensing and biofilm

Eubacteria: General account, occurrence, morphology (structure, shapes), flagella, capsule, nutritional types, endospore, reproduction (binary fission, transformation, conjugation, transduction), economic and biological importance.

Mycoplasma: Occurrence, morphology, reproduction and importance.

UNIT-2

Virus: General characteristics and importance. Structure of TMV and Pox virus, Structure and multiplication of Bacteriophage.

Fungi: General characters, occurrence, thallus organization, reproduction, economic importance. Classification of fungi (Alexopoulos and Ainsworth).

Plant diseases: Biotic and abiotic diseases, important symptoms caused by fungi, bacteria, viruses and MLOs (blights, mildews-downy and powdery, rusts, smuts, canker, mosaic, little leaf, galls etc.).

UNIT-3

Brief account, structure, importance and life history and/or disease cycle and control of the following:

Albugo and white rust; Sclerospora and Downy mildew/Green ear disease of Bajra; Aspergillus; Claviceps and Ergot; Peziza.

UNIT-4

Brief account, structure, importance and life history and/or disease cycle and control of the following:

Puccinia and Black rust of wheat ; Ustilago and loose smut of wheat and covered smut of barley;

Agaricus; Alternaria and early blight of potato.

Suggested Laboratory Exercises:

1. Study of bacteria using curd or any other suitable material, Gram's staining of bacteria.
2. Study of Mycoplasma, TMV, Poxvirus, bacteriophage (photographs/3-D models)
3. Study of symptoms of plant diseases-Downy mildew of Bajra, Green ear of bajra, Powdery mildew, mosaic of bhindi.
4. Study of specimen, permanent slides and by making suitable temporary slides: Albugo-white rust; Sclerospora-downy mildew, green ear; Aspergillus; Claviceps-ergot; Ustilago-loose smut of wheat, covered smut of barley, Puccinia-Black rust of wheat; Agaricus; Peziza and Alternaria-early blight of potato.
5. Media preparation: potato dextrose agar, Nutrient agar.
6. Culture techniques of fungi and bacteria.
7. Visit Local Garden/field study of plants in farmers field/agricultural stations.

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BOTANY-Paper III
Algae, Lichens and Bryophyta
(2 hrs/week)

Unit-1

General characters, Classifications (Smith). Diverse Habitat. Range of thallus structure, photosynthetic pigments and Food reserves. Reproduction (Vegetative, Asexual, Sexual).

Unit-2

Type Studies

Cyanophyceae – Oscillatoria, Nostoc

Chlorophyceae – Volvox, Chara.

Xanthophyceae – Vaucheria.

Phaeophyceae – Ectocarpus.

Rhodophyceae – Polysiphonia.

Unit-3

General characters, Origin, and evolution of Bryophyta. Classification (Eichler); Habitat, Range of thallus structure, Reproduction (Vegetative and Sexual); Alternation of generations; Economic importance.

Type Studies: Hepaticopsida –Riccia, Marchantia

Unit-4

Type Studies: Anthocerotopsida – Anthoceros; Bryopsida – Funaria

Lichens – General characters, habitat, Structure, reproduction and economic and Ecological importance of lichens.

Suggested Laboratory Exercises

1. Study of classwork material by making suitable temporary slides and study of permanent slides of; Oscillatoria, Nostoc, Volvox, Chara, Vaucheria, Ectocarpus, Polysiphonia.
2. Study of external morphology and preparation of suitable sections of vegetative/reproductive parts of Riccia, Marchantia, Anthoceros, Funaria.
3. Study of lichens.

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Suggested Readings

Bold, H.C. Alexopoulos, C.J. and Delevoryas, T.: Morphology of Plant and Fungi (4th Ed.) Harper & Foul Co., New Work, 1980.

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

Gilbart, M.Smith: Cryptogamic Botany, Vol. I & II (2nd Ed.) Tata McGraw Hill. Publishing Co., Ltd., New Delhi, 1985.

Kumar, H.D.: Introductory Phycology, Affiliated East-West Press, Ltd. New York, 1988.

Puri. P.: Bryophytes, Atmaram & Sons. Delhi, Lucknow, 1985.

Sarabhai. R.C. and Saxena, R.C.: A text book of Botany. Vol I & II, Ratan Prakashan Mandir, Meerut, 1980.

Singh, V., Pande, P.C. and Jain, D.K.: A text book of Botany, Rastogi, & Co., Meerut, 2001.

Vashista, B.R.: Botany for Degree Students (Algae, Bryophytes)S. Chand & Co., New Delhi, 2002.

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BOTANY PRACTICAL EXAMINATION B.Sc PART-I
SKELETON PAPER

M.M. 50

TIME: 4 Hours

S.No.	Practical	Regular	ExNC
1 (a)	Prepare the acetocarmine stained slide of the material "A" provided to you. Draw a well labeled diagram of any one stage of nuclear division. Identify it giving reasons.	5	5
1 (b)	Comment and solve the problem on Genetic sallotted to you along with reasons.	5	5
2	Make suitably stained glycerine-preparation of any one alga from the given mixture "B". Draw its labelled diagrams; assign it to its systematic position giving reasons.	5	5
3	Make suitable preparation of the reproductive structure of material "C"(Fungi). Draw labeled diagrams, Identify giving reasons.	5	5
4	Make suitable stained preparation of material "D" (Bryophyta vegetative/reproductive). Draw labeled diagrams. Identify giving reasons.	5	5
5	One Microbiology experiment for comments. Or Gram's staining.	5	5
6	Comment upon spots (1-5)	10	15
7	Viva-Voce	5	5
8	Practical record	5	-
	TOTAL	50	50

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SESSION 2022-2023, EXAMINATION-2023

B .Sc. PART –I

PHYSICS

Paper –I (Mechanics and Oscillations)

Max. Marks-33

Time-Three hours

UNIT-I

Physical laws and Frame of References: - Inertial and non-inertial frames, Transformation of displacement, velocity-acceleration between different frame of references involving translation, Galilean transformation and invariance of Newton’s law.

Coriolis Forces: - Transformation of displacement, velocity and acceleration between rotating frames, pseudo forces, Coriolis, forces, Motion relative to earth, Foucault’s pendulum.

UNIT-II

Conservative forces: - Introduction about conservative and non-conservative force, Rectilinear motion under conservative forces, Potential energy curve and motion of a particle.

Motion under central forces:- Introduction about central forces, motion under central forces, General solution under gravitational interaction, Kepler’s law, Trajectories, Cases of circular and elliptical orbits.

UNIT-III

Centre of mass: - Introduction about centre of mass, Centre of mass frame, Collision of two particles in one and two dimensions (elastic and inelastic) Slowing down of neutron in a moderator, Motion of a system with varying mass: Rocket, Concept of angular momentum and conservation law concerned.

Rigid body:-Equation of motion of a rigid body, Inertial coefficients, Kinetic energy in rotating motion, Concept of principal axis, Precessional motion of a spinning top.

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Damped harmonic oscillator:- Introduction about oscillations in potential well, Damped force and motion under damping, Damped simple harmonic oscillator, Power dissipation, Quality factor, Anharmonic oscillator, Simple pendulum.

Driven harmonic oscillator-I: - Driven harmonic oscillator with damping, Frequency response, phase relations.

UNIT-V

Driven harmonic oscillator-II: - Quality factor, Resonance, Series and parallel LCR circuit.

Coupled oscillations: - Equation of motion of two coupled simple harmonic oscillators, Normal modes, Motion in mixed modes. Transient behavior, Dynamics of a number of oscillations with neighbor interactions.

Paper-II (Electromagnetism)

. Marks-33

Time-Three hours

UNIT-I

Scalar and vector fields:- Concept of field, Scalar and vector fields, Gradient of scalar field, Physical significance of gradient, Divergence and curl of vector fields in Cartesian coordinate system, Problems based upon divergence, gradient and curl, Gauss divergence and Stoke's curl theorem, Gauss law from inverse square law, integral and differential form of Gauss law, Physical significance of Gauss law.

UNIT-II

Electric field:- Invariance of charge, Potential energy of a system of charges, Energy required to build a uniformly charged sphere, Classical radius of electron, Electron, Electric field due to electric dipole, Interaction of electric dipole with external uniform and non-uniform electric field, Potential due to a uniformly charged solid sphere, Poission's and Laplace's equations and their applications to solve problems of electrostatics, Electric field measured in moving frames, Electric fields of a moving charge with constant velocity, Multiple expansion and moments of charge distribution.

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Electric field in matter:- Dielectrics, Induced dipole moments, Polar and non-polar molecules, Free and bound charges, Polarization, Atomic polarizability, Electric displacement vector, Electric susceptibility, Dielectric constant and relation concerned, Electric potential and electric field due to uniformly polarized sphere, Electric field due to a dielectric sphere placed in electric field, Electric field due to a charge placed in a dielectric medium and Gauss law, Clausius-mossotti relation.

UNIT-IV

Magneto statics and magnetic field in matter:- Lorentz force, Magnetic field, Ampere's law and its applications, Ampere's law in integral and differential form, Magnetic vector potential, Poisson's equations for vector potential, Atomic magnet, Bohr magneton, Larmor frequency, Induced magnetic moment and diamagnetism, Spin magnetic moment, Para and Ferro-magnetism, intensity of magnetization, Magnetic permeability and susceptibility, Free and bound current, Magnetic field due to uniformly magnetized and non-magnetized and non-uniformly magnetized materials.

UNIT-V

Maxwell's equations and electromagnetic waves:- Displacement current, Maxwell's equations, Electromagnetic waves, Electromagnetic waves in an medium, Properties of electromagnetic waves, Energy density of electromagnetic waves. Poynting vector, Radiation, Electromagnetic waves in dispersive media, Spectrum of electromagnetic waves.

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Max. Marks-34

Time- Three hours

UNIT-I

Interference-I:- Concept of coherence, Coherence length and time, Huygen's principle, Young's double slit experiment, Types of interference, Interference by division of wave front's: Fresnel's biprism, measurement of wavelength and thickness of a thin transparent sheet; Interference by division of amplitude: Thin film of constant thickness and wedge shaped, Newton's ring and its applications vig. determination of wavelength and refractive index.

UNIT-II

Interference-II:- Michelson interferometer and its applications vig. Measurement of wavelength, difference between two doublets, thickness of a transparent (thin) sheet; Haidinger and Fizeau frindges.

Diffraction-I:- Fresnel's diffraction, Half period zones, Fresnel's diffraction at a circular aperture, straight edge and a rectangular slit, Zone plate, Comparison between zone plate and convex lens.

UNIT-III

Diffraction-II:- Fraunhofer diffraction, Fraunhofer diffraction by single bslit and circular aperture, Fraunhofer diffraction by double slit and N slits, Plane diffraction grating and its use in determining wavelength, missing order phenomenon, Dispersion by a grating, Rayleigh criterion of resolution, Resolving power of a grating and telescope.

UNIT-IV


Polarisation:- Polarization, Plane polarized light, circularly polarized light and elliptically polarized light, Production of polarized light by (i) Refraction (ii) Reflection (iii) Double refraction and (iv) Dichroism, Identification of polarized light, Huygen's theory of double refraction, Production of circularly and elliptically polarized light, Analysis of polarized light, Quarter wave and half wave plates, Optical activity, Laws of optical activity, Fresnel's explanation of optical activity.

UNIT-V

Laser:- Spontaneous and stimulated emission, Einstein's A and B coefficients, Energy density of radiation as a result of stimulated emission and absorption, Population inversion, Methods of optical pumping, Energy level schemes, Types of lasers: He-Ne laser, Ruby laser, CO₂ laser and Nd : YAG laser.

Holography:- Concepts of holography, Principle of holography, Theory, construction and reconstruction of images, application of holography.

Fibre optics:- Introduction of optical fiber, Necessity of cladding, Optical fiber system, Optical fibre cable, Explanation of propagation of light through an optical fibre.


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MATHEMATICS
B.A./B.Sc Part-I Examination

Duration : 3 Hours per Week per Theory Paper.
2 Hours per Week per Batch for Practical
(20 Candidates in each batch)

Examination Scheme :	Min. Pass Marks	Max. Marks
Science -	54	150
Arts -	72	200
	Duration	Max. Marks
Paper – I	Discrete Mathematic 3 hrs.	40 (Science) 53 (Arts)
Paper – II	Calculus 3 hrs.	40 (Science) 53 (Arts)
Paper – III	Analytic Geometry And Optimization Theory 3 hrs.	40 (Science) 53 (Arts)
Practical :-	Optimization Techniques 2 hrs.	30 (Science) 40 (Arts)

Note :-

1. Common paper will be set for both the faculties of Social Science and Science. However, the marks obtained by the candidate in the case of Faculty of Social Science will be converted according to the ration of the maximum marks of the paper in the two Faculties.
2. Each candidate is required to appear in the Practical examination to be conducted by internal and external examiners. External will be appointed by the University and internal examiner will be appointed by the Principal consultation with local Head/Head, Department of Mathematics in the college.
3. An internal/external examination examiner can conduct Practical Examination of not more than 100 (Hundred) Candidate.
4. Each candidate has to pass in Theory and Practical examination separately.

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Paper – I Discrete Mathematics

Teaching : 3 Hours per Week

Max. Marks : 40 (Science)

Duration of Examination : 3 Hours

53 (Arts)

Note :- This paper is divided into FIVE Units. TWO questions will be set from each Unit. Candidates are required to attempt FIVE questions in all taking ONE Question from each Unit. All questions carry equal marks.

Unit-I

Sets Cardinality, Principle of inclusion and exclusion, Mathematical induction, Relations and Functions, Binary relations, Equivalence relations and partitions.

Unit-II

Partial Order relations and Lattices, Chains and Anti-chains. Pigeon hole principle. Boolean Algebra-Lattices and Algebraic structure, Duality, Distributive and Complemented Lattices, Boolean Lattices, Boolean functions and Boolean expression.

Unit-III

Logic and propositional calculus, Simple and compound propositions, Basic logical operations. Truth tables, Tautologies and contradictions, Propositional functions, Quantifiers. Discrete numeric functions, Generating function, Recurrence relations and Recurrence algorithms, Linear recurrence relation with constant coefficients and their solutions, Solution by the method of generating functions.

Unit-IV

Basic Concept of graph theory, Types of graph (connected Graphs, Regular graph, Planar graphs) walk, Paths & Circuits, Shortest path problem. Operations on graphs (union, join, products.)

Unit-V

Matrix representation of graphs, Adjacency matrices, Incidences matrices, Tree, Spanning tree, Minimum spanning tree, Distance between vertices, Center of tree, Binary tree, Rooted tree. Hamiltonian and Eulerian graphs.

Reference books :

1. K.H. Rosen, Discrete Mathematics and it's Applications, McGraw Hill-1999.
2. N.L. Biggs, Discrete Mathematics, Oxford Science Publication, 1985.
3. C.L. Liu and D.P. Mohapatra, Elements of Discrete Mathematics, Tata McGraw Hill. 2008.
4. T. Koshy Discrete Mathematics with Applications, Academic Press, 2005.
5. N.Deo Graph Theory. Prentice Hall of India, New Delhi, 2004.

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Paper – II Calculus

Teaching : 3 Hours per Week

Max. Marks : 40 (Science)

Duration of Examination : 3 Hours

53 (Arts)

Note :- This paper is divided into FIVE Units. TWO questions will be set from each Unit. Candidates are required to attempt FIVE questions in all taking ONE Question from each Unit. All questions carry equal marks.

Unit-I

Derivative of the length of an arc. Pedal equation Curvature-Variou formulae, Centre of curvature and Chord of curvature. Envelope and evolutes.

Unit-II

Partial differentiation. Euler's theorem for homogenous functions. Chain rule of partial differentiation. Total differentiation, differentiation of implicit functions.

Unit-III

Maxima and Minima of functions of two variables. Lagrange's method of undermined multipliers. Asymptotes. Multiple points. Curve tracing of standard curves (Cartesian and polar curves).

Unit-IV

Beta and Gamma functions, Reduction formulae (simple standard formulae), Double integrals in Cartesian and Polar Coordinates, Change of order of integration, Triple integrals. Dirchlet's integral.

Unit-V

Area, Rectification, Volumes and Surfaces of solids of vevolution.

Reference Book :-

1. M.J. Strauss. G.I. Bradley and K.J. Smith, Calculus (3rd Edition), Dorling Kindersley (India) Pvt. Ltd. (Pearson Education), Delhi, 2007.
2. H. Anton, I. Bivens and S. Davis, Calculus (7th Edition), John Wiley and sons (Asia), Pt. Ltd Singapore, 2002.
3. G.B. Thomas R.L. Finnary. M.d. Weir, Calculus and Analytic Geometry, Pearson Education Ltd. 2003.

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Paper – III Analytic Geometry and Optimization Theory

Teaching : 3 Hours per Week

Max. Marks : 40 (Science)

Duration of Examination : 3 Hours

53 (Arts)

Note :- This paper is divided into FIVE Units. TWO questions will be set from each Unit. Candidates are required to attempt FIVE questions in all taking ONE Question from each Unit. All questions carry equal marks.

Unit-I

Sphere, Cone :

Unit-II

Cylinder, Central Conicoids-Ellipsoid, Hyperboloid of one and two sheets, tangent lines and tangent planes. Direct sphere, Normal's.

Unit-III


Generating lines of hyperboloid of one sheet and its properties. Reduction of a general equation of second degree in three-dimensions to standard forms.

Unit-IV

The linear programming problem. Basic solution. Some basic properties and theorems on convex sets. Fundamental theorem of L.P.P., Theory of simplex method.

Unit-V

Duality, fundamental theorem of duality, Properties and elementary theorems on duality. Assignment problem, Transportation problems.


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**B.A/B.Sc. MATHS PART-I
PRACTICAL EXAM SYLLABUS-2023**

Practical-Optimization Techniques

Teaching : 2 Hours per Week

Examination

Duration : 2 hours

Scheme	Science	Arts
Max. Marks	30	40
Min. Pass Marks	10	13
Distribution of Marks		
Two Practical one from each group (10 Marks each)	Science 20	Arts (13 Marks each) 26 Marks
Practical Record	05	07
Vivo voce	05	07
Total Marks	30	40

Group A : Modeling of industrial and engineering problems into LPP and its dual and their solution by Simplex Methods

Group B : Modeling of industrial and engineering problems into Assignment Problems and Transportation problems and their solution.

Note :-

1. Each Candidate (Regular/Non-collegiate) has to prepare his/her Practical record.
2. Each Candidate has to pass in Practical and Theory examinations separately.

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MATHEMATICS
B.A./B.Sc Part-II Examination

Duration : 3 Hours per Week per Theory Paper.
2 Hours per Week per Batch for Practical
(20 Candidates in each batch)

Examination Scheme :	Min. Pass Marks	Max. Marks
Science -	54	150
Arts -	72	200
	Duration	Max. Marks
Paper – I	Real Analysis and Metric Space 3 hrs.	40 (Science) 53 (Arts)
Paper – II	Differential Equations 3 hrs.	40 (Science) 53 (Arts)
Paper – III	Numerical Analysis 3 hrs.	40 (Science) 54 (Arts)
	Vector Calculus	
Practical :-	Numerical Methods 2 hrs.	30 (Science) 40 (Arts)

Note :-

1. Common paper will be set for both the faculties of Social Science and Science. However, the marks obtained by the candidate in the case of Faculty of Social Science will be converted according to the ration of the maximum marks of the paper in the two Faculties.
2. Each candidate is required to appear in the Practical examination to be conducted by internal and external examiners. External will be appointed by the University and internal examiner will be appointed by the Principal consultation with local Head/Head, Department of Mathematics in the college.
3. An internal/external examination examiner can conduct Practical Examination of not more than 100 (Hundred) Candidates. (20 candidates in each batch)
4. Each candidate has to pass in Theory and Practical examination separately.

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**B.A/B.Sc. MATHS PART-II
PRACTICAL EXAM SYLLABUS-2023**

Practical-Numerical Methods

Teaching : 2 Hours per Week per Batch

Examination

Duration : 2 hours

Scheme	Science	Arts
Max. Marks	30	40
Min. Pass Marks	10	13
Distribution of Marks		
Two Practical one from each group (10 Marks each)	Science 20	Arts 26 Marks (13 Marks each)
Practical Record	05	07
Vivo voce	05	07
Total Marks	30	40

Group A : Numerical integration using Trapezoidal and Simpson’s rules. Numerical solution of Algebraic and Transcendental equations using
(i) Bisection method, (ii) Secant method (iii) Regula-Falsi method (iv) Iteration method. (v) Newton-Raphson Method.

Group B : Numerical Solution of system of linear equations by Gauss elimination. Jacobi and Guass-Seidel methods. Solution of linear differential equations of first order and first degree with initial and boundary condition using modified Euler’s method Runge-Kutta Fourth order method.

Note :

1. Problems will be solved by using Scientific Calculators (non-Programmable)
2. Candidates must know about all functions and operations of Scientific Calculator.
3. Each Candidate (Regular/Non-collegiate) has to prepare his/her Practical record.
4. Each Candidate has to pass in Practical and Theory examinations separately.

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MATHEMATICS
B.A./B.Sc Part-III Examination

Duration : 3 Hours per Week per Theory Paper.
2 Hours per Week per Batch for Practical

Examination Scheme :	Min. Pass Marks	Max. Marks	
Science -	54	150	
Arts -	72	200	
	Duration	Max. Marks	
Paper – I	Algebra	3 hrs.	40 (Science)
			53 (Arts)
Paper – II	Complex Analysis	3 hrs.	40 (Science)
			53 (Arts)
Paper – III	Mechanics	3 hrs.	40 (Science)
			54 (Arts)
Practical :-	Computer Programming in C	2 hrs.	30 (Science)
			40 (Arts)

Note :-

1. Common paper will be set for both the faculties of Social Science and Science. However, the marks obtained by the candidate in the case of Faculty of Social Science will be converted according to the ration of the maximum marks of the paper in the two Faculties.
2. Each candidate is required to appear in the Practical examination to be conducted by internal and external examiners. External will be appointed by the University and internal examiner will be appointed by the Principal consultation with local Head/Head, Department of Mathematics in the college.
3. An internal/external examination examiner can conduct Practical Examination of not more than 100 (Hundred) Candidates. (20 candidates in each batch)
4. Each candidate has to pass in Theory and Practical examination separately.

B.A./B.Sc. MATHS PART-III

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PRACTICAL EXAM SYLLABUS-2023

Practical- Computer Programming in C

Teaching : 2 Hours per Week per Batch

Examination

Duration : 2 hours

Scheme	Science	Arts
Max. Marks	30	40
Min. Pass Marks	10	13
Distribution of Marks		
Two Practical of		
10 Marks each	=	20 (13 Marks each) 26 Marks
Practical Record	05	07
Vivo voce	05	07
Total Marks	30	40

The paper will contain TWO practical. The candidates are required to attempt both practical

Programming languages and problemsolving on computers, Algorithm, Flow chart, Programming in C-Constants, Variables, Arithmetic and logical expressions, Input-Output , Conditional statements, Implementing loops in Programs, Defining and manipulation arrays and functions.

Programming in C and execution for the result of

- (i) Solution of linear algebraic equations by Gauss elimination method.
- (ii) Solutions of algebraic and transcendental equations by Bisection, False position and Newton-Raphson Methods.
- (iii) Solution of ordinary differential equations by Eulers and Runge-Kutta 4th order method.
- (iv) Numerical integration by Trapezoidal and Simpsons one third rule.

Note :

- 1. Each Candidate (Regular/Non-collegiate) has to prepare his/her Practical record.
- 2. Each Candidate has to pass in Practical and Theory examinations separately.

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SYLLABUS FOR THE SESSION 2022-2023 (MAIN EXAMINATION-2023)

**GEOLOGY
B.Sc. Part-I**

Scheme: Theory

Max. Marks: 100

Paper I: Physical Geology

Duration: 3 hrs.

Min Pass Marks: 36

Max Marks 50

**Paper II: Crystallography
and Mineralogy**

Duration: 3 hrs.

Max. Marks 50

Practical (One)

Duration: 4 hrs.

Max. Marks 50

Note: Each paper will contain nine questions having three questions in each section. Candidate is required to attempt five questions in all selecting at least one question from each section.

GEOLOGY Paper-I

Physical Geology

Section-A

Earth system science-its sub disciplines, their mutual relationship and relationship with other subjects; scope and relevance to society. Earth history and solar system. Shape, size and origin of earth, internal structure, constitution and composition of earth. Earthquake and volcanism.

Section-B

Elements of continental drift, sea floor spreading, plate tectonics, magnetic area, mid oceanic ridges and transform fault. Geosyncline, Mountain building and Isostasy.

Section-C

Geological time scale and time record; Natural water cycle and ground water, weathering and erosion, geological work of River, Wind, Groundwater, Glacier and Ocean.


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GEOLOGY Paper-II
Crystallography and Mineralogy

Section-A

Definition of mineral and crystal-crystalline, cryptocrystalline and amorphous state. Geometric properties of crystals-faces, edges, solid angle. Interfacial angle, use of contact goniometer. Elements of symmetry, axial ratio, crystal structures-unit cell, crystal notation and zones.

1. Tetrahedrite type or hexatetrahedral class; Tetragonal-Zircon type or ditetragonal bipyramidal class; Hexagonal-Beryll type or dihexagonal bipyramidal class, calcite type of ditrigonal scalenohedral class recurmaline type of ditrigonal pyramidal (hemimorphic class), Quartz type or trigonal trapezohedral class; Orthorhombic-Barytes types or bipyramidal class Monoclinic Gypsum type or Prismatic Class and Trilinic system-Axinite type or pinacoidal class.

Section-B

Definition of mineral: rock forming, ore minerals and gemstones. Physical properties of minerals and their identification. Formation of minerals, elementary idea about experimental work on mineral stability, Isomorphism, Polymorphism, Pseudo morphism and Solid Solution

Optional mineralogy- Construction of petrological microscope, pleochioism, extinction angle, refractive index, interference colours, Optical properties of Quartz, Biotite, Hornblende, Hypersthene and Feldspars.

Section-C

Classification of silicates. Description of following rock forming mineral groups; Quartz, Feldspar, Felspathoid, Pyroxene, Amphibole, Mica and Garnet.

Physical and optical properties of following minerals; Olivine, Epidote, Beryl Apatite, Cordierite, Tourmaline, Staurolite, Topaz, Zircon, Sphene, Chlorite. Serpentine, Andalustite, Kyanite, Sillimanite, Talc Kaolin, Fluorite, Magnetite and Rutile.

Concept on twinning in crystals, laws of twinning and importance types of twinning.

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Practical**Min. Pass Marks 18****Duration: 4 hrs.****Max. Marks 50****Crystallography and mineralogy:**

Crystallography: Determination of symmetry in crystal models and measurement of interfacial angles with contact goniometer.

Drawing of crystals of cubic system by Clinographic Projection.

The Study of the symmetry, forms and combination of forms in crystals given below.

Cubic system- Galena, Fluorite Magnetite and Garnet, Pyrite tetrahedrite.

Tetragonal system-Zircon, Rutile, Cassiterite, Hexagonal system Beryl, Tourmaline and Quartz.

Orthorhombic system- Barite, Olivine, Staurolite, Sulphur.

Monoclinic system-Gypsum, Orthoclase, Augite, Hornblende, Epidote.

Triclinic system-Axinite, albite, Study of simple twinning in crystals.

Sp. Gr. Determination by Minerals Walkers steel yard balance.

Study of Hardness: Lustre, Fracture, Cleavage and streak of minerals.

Study of the Physical properties and diagnostic features of the following minerals:

Opal, hematite, magnetite, halite, calcite, fluorite, tourmaline, magnetite, orthoclase, microcline, plagioclase, hypersthene, augite, tourmaline, tremolite, hornblende, asbestos, beryl, nepheline, sodalite, garnet, olivine, zircon, topaz, sillimanite, kyanite, quartz and its varieties, chalcedony, flint and jasper; epidote, staurolite, muscovite, biotite, natrolite, talc, chlorite, serpentine, kaoline, sphene, apatite, garnet, wollastonite and augite.

Study of petrological microscope and its parts inclusive of polarizer and their function, observation of Becke line and relative refractive index. Study of pleochroism in biotite, hornblende, tourmaline, hypersthene, andalusite and staurolite; study of twinkling in calcite.

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B.Sc. Part –I

PAPER-I : MICRO ECONOMIC THEORY

UNIT- I

Meaning, Nature and Scope of Economic, Basic Economic problems, methodology: Micro and Macro Economics, Static and Dynamic analysis, Positive and Normative Economic.

UNIT-II

Law of Demand and the Demand curve. Elasticity of Demand: Price, Income and cross Elasticity, Are and point Elasticity factor affecting price Elasticity of Demand. Substitute and complementary Goods. Consumer Surplus.

Theory of consumer Behaviour: utility Analysis; Cardinal and ordinal Approach Inferior and Giffen Goods.

UNIT-III


Production Theory: Meaning and factors of productions. Production function: Law of variable Proportions, Three Stages of production function, Law of Return to Scale. Iso-quant and Iso-Cost curves. Optimum factor combination, Theory of Cost: Short-Run and long- Run Cost Curves. Theory of Revenue: TR, AR, and MR.

UNIT-IV

Market Structures: Determination of price and output in the short and Long Run under perfect competition, Monopoly, Discriminating Monopoly, Monopolistic –Competition, excess capacity.

UNIT-V

Theory of Distribution, Marginal productivity Theory, Factor pricing under perfect and Imperfect competition in labor Market, Ricardian Theory of Rent, Modern theory of Rent and Quasi-rent. Theory of Interest: Classical and Liquidity preference, Theory of profit, Risk and uncertainty.


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PAPER-II: INDIAN ECONOMY

UNIT-I

Basic feature and present position of Indian Economy, Natural Resources, population: Demographic feature and major trends, concept of population Dividend, population Policy, Human Resource Development. National Income in India: Trends and composition.

UNIT-II

Agriculture: Role and Importance of Agriculture in the Indian Economy, Land Reform, Growth of Modern Inputs Irrigation, HYV, Fertilization, Institutional credit, Micro-finance, Marketing of Agricultural Goods support price, concept of crop insurance, food security. Services Sector in India: IT Education and Health.

UNIT-III

Industry: Role, Strategy and Challenges, Growth of MSMs, public and private sector industries , Industrial finance, Industrial policy of 1991, New policy Initiatives for Industrial Development. New Economic policy and Disinvestment, foreign direct investment. Foreign Trade: Size, Composition and Direction, Recent trends foreign trade policy.

UNIT-IV

Planning in India: Objection and Achievements, NITI Aayog National Development Agenda, Sectoral Reforms in Infrastructure after 1991.

UNIT-V

Problems and Solutions: Poverty, Unemployment, Inflation and Regional Inequalities. Rural Development programmes and policy.

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B.A./B.Sc. Part-I Geography Scheme of Examination

Faculty	Min. Pass Marks	Max. Marks
Arts/Social Science	72	200
Science	54	150
Paper I	Physical Geography	Arts 75/Science 50
Paper II	Geography of Rajasthan	Arts 75/ Science 50
Practical	18	Arts 50/ Science 50

Instructions

1. Students are permitted to use the stencils, simple calculator and log tables wherever needed in both theory and practical examinations. Each theory paper will have a teaching of 6 hours per week.
2. There will be a common paper for Arts and Science.
3. Q. 1 will be compulsory and will cover the entire course of the paper.
Q No. 1 Of 20% marks of the maximum marks be set in two parts.
(a) Part (a) Will have ten items for locating on a map (to be supplied by examination center) carrying 10% marks of the maximum marks and candidate shall attempt any five items.
(b) Part (b) Will have 10 short answer questions carrying 10% marks of the maximum marks and candidates shall attempt any five questions.
4. Remaining 9 questions carrying equal marks will be set with two questions from each Section/Unit of the syllabus.
5. Candidate will attempt 5 questions in all including question No. 1 selecting at least one question from each Section/Unit.
6. Practical examination will be conducted by the board of examiners.
7. The candidate will have to pass in theory and practical separately.
8. The non- collegiate candidates will have to attend a practical training camp of 48 hours at department of geography affiliated to the PDUSU sikar/ any department of geography government college affiliated with PDUSU sikar noticed by the University from time to time in which Geography subject is taught on payment of Fee. Fixed by the university The candidate appearing at examination from any examination center located in sikar and Jhunjhunu District will attend the practical camp at the university graduate department on payment of fee fixed by the university. The candidate will procure certificate of successful completion of practical training camp from the college/ Department of geography and produce the same at the time of geography practical examination.


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Paper-I : Physical Geography

Unit – I

Definition, scope and development of physical geography, solar system origin of the solar system. geological history of the Earth; Zoning of Earth’s interior, rocks, types and characteristic, origin of continents and oceans, continental drift theory and plate tectonics. Concept of isostasy: mountain building theory - Kober, plate tectonics.

Unit – II

Denudation, cycle of erosion: views of W.M. Davis and W. Penck, erosional and depositional topographies: river, underground water, glacier, wind and oceanic waves.

Unit - III

Composition and structure of the atmosphere, insolation, air pressure, pressure belts and planetary winds, monsoon and local winds, classification of clouds and precipitation, air masses and cyclones. - Tropical and temperate, classification of the world climates: Koppen and Thornthwaite, general climatic classification.

Unit – IV

Surface configuration of oceans bottom: Pacific, Atlantic and Indian oceans, ocean deposits, horizontal and vertical temperature of oceans, oceanic salinity, tides, oceanic waves and currents, coral reefs and their origin; views of Darwin and Dana, W.M., Davis, Murray, classification of marine resources.

Unit - V

Biosphere and its components, ecosystem, plant community and animal kingdom, biomes: equatorial rainforest, monsoon, savanna and temperate, grasslands.

Recommended Readings.

1. चौहान, वी.एस. व गौतम, ए. 2005, : भौतिक भूगोल (जीवमण्डल सहित)। रस्तोगी पब्लिकेशन्स, मेरठ।
2. दयाल, पी. 2012, :भौतिक भूगोल। राजेश पब्लिकेशन्स, नई दिल्ली।
3. गौतम, अल्का, 2012: भौतिक भूगोल। रस्तोगी पब्लिकेशन्स, मेरठ।
4. सिंह, सविन्द्र, 2005 : भू-आकृति विज्ञान। तारा पब्लिकेशन्स, वाराणासी।
5. सिंह, सविन्द्र, 2011 : भौतिक भूगोल का स्वरूप। प्रयाग पुस्तक भवन, इलाहाबाद।
6. भार्मा, एच.एस., भार्मा, एम.एल. एण्ड मिश्रा, आर.एन. 2008 : भौतिक भूगोल। पंचशील प्रकाशन जयपुर।
7. Hussain, M. 2001, Fundamentals of Physical Geography, Rawat Publication, Jaipur
8. Hess, D. 2012: Physical Geography: A Landscape Appreciation, PHI Learning Private Limited, New Delhi, Mcknight’s Tevtt Edition.
9. Khullar, D.R. 2012: Physical Geography, Kalayani Publishers, New Delhi.
10. Sharma, R.C. and Vatal M. 1999: Oceanography for Geographers. Chaitanya Publishing House, Allahabad.
11. Strahler, A.N. and Strahler, A.H. 1989: Elements of Physical Geography. John Wiley & Sons, New York.
12. Tikka, R.N. 1999: Physical Geography. Kedar Nath Ram Nath & C. Meerut.


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Paper II: Geography of Rajasthan

Unit - I

Physiography of Rajasthan: geological structure, relief, drainage, climate, natural vegetation, drought, desertification, soils, soil erosion and conservation, water resources - availability, problems and conservation.

Unit - II

Mineral resources: metallic and nonmetallic, distribution and production; energy resources: distribution and production (hydro-electricity, coal, petroleum, solar energy and bio-energy) irrigation resources distribution , irrigation projects: detailed study of Indira Gandhi canal project, Chambal valley project, Mahi Bajaj Sagar projects on physical and socio-economic aspects.

Unit - III

Agriculture distribution in Rajasthan: development under five year plans, problems of agriculture development, wheat, rice, bajara, pulses, cotton, ground nuts, general land use, live-stock and dairy development.

Unit - IV

Industries: textile, sugar, cement, marble and granite, fertilizer, zinc and copper smelting. Transport & trade, development of tourism, desert development programme tribal areas development programme, Aravalli hill development programme.

Unit - V

Cultural and development aspects: population- number, growth, distribution and density, rural and urban, male and female population, occupational structure, population problems, detailed study of bhil, meena and garasia. Settlement pattern: types of settlements, building materials and house types in Rajasthan with examples, factors affecting settlement.

Recommended Readings:

1. Bhalla, L.R. 1996-97: Geography of Rajasthan. Kuldeep publications, Jaipur.
2. Gujar, R.K. 1992: Geography of Indira Gandhi Canal. Rajasthan Hindi Granth Academy
3. Lodha, R. & Maheshwari, D.2001: Geography of Rajasthan. Shahitya Bhawan Publications, Hospital Road, Agra.
4. Mishra, V.C. 1967: Geography of Rajasthan. National book trust of India. New Delhi.
5. Singh, R.L. 1971 (ed.): India A Regional Geography NCSI. Varanasi.
6. Attar Singh. 1992: Flood Prone Areas of India. A viskar Publishers Jaipur
7. Sharma H.S. and M.L. Sharma 2014: Geography of Rajasthan. Panchcil Publisher, Jaipur.
8. नरसिंहका, एल.एन., 2012-13 : राजस्थान की अर्थव्यवस्था । कौलेज बुक हाउस, जयपुर ।
9. साईवाल, स्नेह 2012 : राजस्थान का भूगोल । कौलेज बुक हाउस, जयपुर ।
10. सक्सीना, एच.एम. 2012 : राजस्थान का भूगोल । राजस्थान हिन्दी ग्रन्थ अकादमी, जयपुर ।

**B.A./B.SC PART-I Practical
Scheme of Examination**

Min. Pass Marks: 18

Max. Marks: 50

	Bifurcation of Marks	Time
Written test	24	3 hrs.
Field Survey and Viva voce	10+04	2.5 hrs.
Record and Viva Voce	08+04	

N.B. 1. There shall be 6 questions in written paper selecting at least two questions from each Section/Unit. Candidates are required to attempt 3 questions selecting 1 question from each Section/Unit. All question carries equal marks. Each practical batch of 40 students will be allotted a teaching of 4 hours per week for practical's.

SYLLABUS

Unit – I

Definition and types of scale: simple, comparative, diagonal.

Graph: line graph, bar graph, combined line and bar graph, hythergraph and climograph; climatograph, water budget, graph, wind rose.

Weather maps: weather symbols, representation of atmosphere features, interpretation of Indian daily weather maps (July and January), weather instruments.

Unit - II

Methods of showing different relief features: hachures, hill shading, bench mark, spot height, formlines, contours and drawing of cross Section/Units (conical hill and plateau, types of slopes, valleys, ridge and saddle, gorge, waterfall and rapids, escarpment, lake, spur, col, meanders and cliff)

Profiles- serial, superimposed, projected and composite.

Unit - III

Surveying: meaning, classification and significance.

Chain and tape surveying: open and closed traverse.

Recommended Readings:

1. चौहान, पी.आर. 2008: प्रयोगात्मक भूगोल। वसुन्धरा प्रकाशन, जयपुर।
2. भार्मा, जे.पी. 2011: प्रयोगात्मक भूगोल की रूपरेखा। रस्तोगी पब्लिकेशन, मेरठ।
3. Singh, L.R. 2006: Practical Geography. Prayag Pustak Publisher, Allahabad, U.P.
4. Monkhouse, F.J. and Wilkinson, F.J. 1985: Maps and Diagrams. Methuen, London.
5. Singh, R.L. and Singh Rana P.B. 1991: Elements of Practical Geography. Kalyani Publishers, New Delhi.
6. Sarka, A.k. 1997: Practical Geography: A Systematic Approach. Orient Longman, Kolkata.
7. Venkatrameiah, C. 1997: A Text Book of Surveying. University Press. Hyderabad.

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SYLLABUS FOR THE SESSION 2022-2023 (MAIN EXAMINATION-2023)

B.Sc. PART-I

STATISTICS

Scheme:	Duration	Max. Marks		Min Pass Marks	
		Sc.	Arts	Sc.	Arts
Paper-I	3 hrs.	50	65	18	24
Paper-II	3 hrs.	50	65	18	24
Practical	3 hrs.	50	70	18	24
	Total	150	200	54	72

Note: In each question paper, 10 (ten) questions will be set having 2 (two) from each unit. Candidates have to answer five questions in all, taking not more than one from each unit.

Paper –I Probability Theory

Unit –I

Important concepts of Probability: Random experiment: Trial, Events and their types. Definitions of probability. Sample point and sample. Space. Axiomatic Approach of Probability and its Properties. Addition and Multiplication theorems of probability. Conditional Probability. Bayes theorem and its Applications (Simple Problem Only). **18 hours**

Unit-II

Random Variable: Definition with Illustrations, Types of Random Variables. Probability Mass Function, Probability Density Function. Distribution Function and its properties. Joint Probability Distribution. Marginal and conditional Probability Distribution and density functions (Continuous and Discrete Cases). chebychev's Inequality and its applications. **18 hours**


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Unit-III.

Mathematical Expectation: Expectation of a random variable and its simple properties. Addition and Multiplication Theorems of Expectation. Conditional Expectation. Definition of Variance and Covariance and properties. Raw and Central Moments. Moment Generating Function and their properties. **18 hours.**

Unit-IV

Univariate Discrete Distributions and their proper Bernoulli distribution. Binomial Distribution, Poisson distribution Geometric Distribution. Idea of Hyper-geometric and negative Binomial Distribution. **18 hours**

Unit-V

Univariate Continuous Distributions and their Properties: Rectangular Distribution, Normal Distribution Idea of Exponential Distribution, Cauchy Distribution, Gamma Distribution, Beta Distribution. **18 hours**

Paper II: Descriptive Statistics

Unit-I

Types and Presentation of Data: Concepts of a statistical population and data. Qualitative and Quantitative data, discrete and continuous data; frequency and non-frequency data. Geographical & Chronological Data. Primary Data and Secondary Data. Tabular presentation of data-Construction of tables. Types of tables. Frequency distribution Discrete, grouped, continuous and cumulative Graphical presentation of data-Histogram, frequency polygon, frequency curve and ogives. **18 hours.**

Unit-II

Statistical analysis of Quantitative Data: Different Types of scales-nominal, ordinal, intervals and ratio, Univariate Data-measures of central tendency, dispersion, moments and its computation from data. Absolute and relative measures of skewness and kurtosis based on quintiles and moments. Sheppard's Correction for moments (without Proof). **18 hours**

Unit-III

Curve fitting and Theory of Attributes: Principle of least squares, fitting of straight line, parabola and curves reducible to straight line (exponential and power curve). Class frequency, order of a class frequency, ultimate class frequency, consistency of data independence and association of attributes. Various measures of association. **18 hours**

Unit-IV

Statistical Analysis of Bivariate Data: Correlation analysis-scatter diagram, Karl-Pearson's coefficient of correlation and its properties Correlation of bivariate frequency distribution, Spearman rank correlation. Regression analysis-Fitting of regression lines, regression coefficients and their properties. **18 hours.**

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Unit-V

Finite Differences: Operators E , Δ , ∇ their relationship and properties, factorial notation. Difference table fundamental theorem of finite differences. Estimation of one and to missing terms. Meaning of interpolation and extrapolation. Newton's forward and backward formulae for equal intervals, Lagrange's Formula and numerical problems. **18 hours**

Paper III. Practical Paper:

1. Exercise on mathematical expectations and finding Mean, Variance, Skewness and Kurtosis of Univariate probability distributions.
2. Fitting standard univariate discrete and continuous probability distribution.
3. Computation for Marginal and Conditional Distributions.
4. Presentation of data through frequency Table, and Graphs.
5. Calculation of Measures of Central tendency, Dispersion, moments and Skewness and Kurtosis.
6. Computation of Correlation Coefficient of bivariate data and bivariate frequency distribution table.
7. Regression of two variables.
8. Fitting of curves by the least square method.
9. Computation of Spearman's rank correlation.
10. Construction of Difference table.
11. Interpolation Problems based on Newton and Langrange's Formulae.

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B.Sc. PART-I PSYCHOLOGY

SCHEME OF EXAMINATION :

Faculty		Max. Marks	Min. Passing Marks	
Arts		200	72 (Th.54 Pr.18)	
Science		150	54 (Th.36 Pr.18)	
Paper	Nomenclature	Duration	Max. Marks	
			Arts	Science
I	Basic Psychological Processes	3 Hrs.	75	50
II	Social Psychology	3 Hrs.	75	50
III	Practical	3 Hrs.	50	50

NOTE :-

There will be three papers in Psychology. Each Paper will be of 3 hours. There will be a common paper for Arts and Science. In I and II Papers there will be 3 Sections A, B and C and will cover the entire course content of the paper.

Section-A Will contain 10 questions of 20 words each. Each question will be of 1.5 marks for Arts students and 1 mark for Science students. Thus, Part-A will be of 15 marks for Arts students and of 10 marks for Science students.

Section-B Will contain 7 questions of 50 words each, out of which students are required to attempt 5 questions. Each question will be of 3 marks for Arts students and of 2 marks for Science students. Thus, Part-B will be of 15 marks for Arts student and of 10 marks for Science students.

Section-C Will contain 3 long questions each with internal choice. Each question will be of 15 marks for Arts students and 10 marks for Science students. Thus, Part-C will be of 45 marks for Arts students and 30 marks for Science students.

For clarification the distribution of marks is tabulated as below:-

ARTS			
Section	No. of Questions	Marks	Total
A	10	1.5	15
B	5 (Out of 7)	03	15
C	3 (With internal choice)	15	45
Total Marks			75
SCIENCE			
Section	No. of Questions	Marks	Total
A	10	01	10
B	5 (Out of 7)	02	10
C	3 (With internal choice)	10	30
Total Marks			50

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Paper I – Basic Psychological Processes

Section – A

1. Introduction: Definition and Goals of Psychology; History- Structuralism, Functionalism, Behaviorism, Gestalt and Psychoanalysis; Modern Perspectives- Biological, Psychodynamic, Behavioral, Cognitive, Humanistic, Evolutionary and Socio-cultural; Methods- Observation, Case Study, Surveys and Experimental.
2. Biological Basis of Behavior: The Nervous System-Structure and Functions of Neuron. Structure and Functions of Central Nervous System and –Peripheral Nervous System.
3. Sensation and Perception: Sensation- Meaning, Sensory Receptors, Sensory Thresholds, Habituation and Sensory Adaptation. Perception- Meaning, Constancies- Size, Shape and Brightness, Gestalt Principles, Factors Influencing Perception.

Section-B

4. Learning: Definition and Theories- Classical Conditioning, Operant Conditioning, Cognitive Learning, Observational Learning.
5. Memory: Definition; Encoding, Storage and Retrieval Processes; Models- Level of Processing, Parallel Distributed Processing and Information Processing- Sensory, Short Term and Long Term Memory; Forgetting- Nature and Causes.
6. Motivation and Emotion: Motivation - Meaning and Approaches- Instinct, Drive—reduction, Arousal, Incentive and Humanistic. Emotion- Elements: Physiology, Expression and Subjective Experience; Theories- Cannon-Bard, James-Lange, Schachter-Singer, Opponent-Process.

Section-C

7. Cognition: Thinking- Mental Imagery and Concepts; Problem Solving- Trial and Error, Algorithms, Heuristics, Insight; Barriers to Problem Solving.
8. Intelligence: Definition and Theories- Spearman, Guilford, Cattell, Sternberg, Gardner; Meaning of IQ; Intelligence Tests.
9. Personality: Definition; Type Theories and Trait Theories - Allport, Cattell, McCrae and Costa; Personality Assessment- Self-report Inventories, Projective Tests and Behavioural Assessments.

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Paper II – Social Psychology

Section-A

1. Introduction: Meaning, Nature, Scope and Goals of Social Psychology. Methods of Social Psychology: Experimental and Non-Experimental Methods.
2. Social Perception and Person Perception: Social Perception- Meaning and Nature; Perceptual Defense, Perceptual Accentuation and Subliminal Perception. Person Perception: Meaning and Nature, Role of Non-verbal Cues; Perceivers' Characteristics and Role of Ongoing Interaction.
3. Attitudes: Nature, Functions, Formation, Change and Measurement.

Section-B

4. Prejudice and Discrimination: Nature and Origin; Reduction of Prejudice and Discrimination.
5. Interpersonal Attraction: Proximity and Affective basis, Acquaintance and Need to Affiliate; Effects of Observable Characteristics, Similarity and Mutual liking.
6. Leadership: Definition and Functions; Types of Leadership. Trait, Situational and Contingency Approaches.

Section-C

7. Communication: Meaning, Nature and Types: Verbal and Non-verbal; Barriers in Communication.
8. Pro-Social Behavior: Personal, Situational and Socio-Cultural Determinants. Explaining Pro- Social Behavior: Empathy, Altruism Hypothesis, Negative-State Relief Model, Emphatic-Joy Hypothesis and Genetic-Determinism Model.
9. Aggression and Social Problems: Aggression- Theories, Determinants, Prevention and Control; Social Problems - Meaning and Nature; Types of Social Problems - Poverty, Deprivation, Population Explosion, Economic Development; Solutions to Social Problems.

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Practical

1. Human Maze Learning
2. Measurement of Intelligence (Performance Test)
3. Experiment of Memory(Meaningful and Non-sense Syllables through Memory Drum)
4. Experiment of Figure Ground Reversal
5. Measurement of Emotions by Facial Expression
6. Measurement of Attitude
7. Measurement of leadership
8. Measurement of Aggression
9. Measurement of Altruism
10. Assessment of Social Support

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